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AFRICA PILOT

Volume II

SOUTH AND EAST COASTS OF AFRICA FROM CAPE OF GOOD HOPE TO RAS HAFUN

PUBLISHED BY THE HYDROGRAPHIC OFFICE
UNDER THE AUTHORITY OF THE
SECRETARY OF THE NAVY

FIRST EDITION

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PREFACE.

This publication contains the sailing directions for the south and east coasts of Africa from Cape of Good Hope to Ras Hafun.

The information contained in this publication is taken from all available sources and principally from British Admiralty publication, "Africa Pilot," Part III. It cancels all supplements, addenda, etc., and includes all Notices to Mariners up to and including No. 16 of 1916.

The bearings and courses are *true*, in degrees from 0° (north) to 360° (clockwise).

Bearings limiting the sectors of lights are toward the light.

The directions of winds refer to the points from which they blow; of currents, the points toward which they set. These directions are *true*.

Variations for the year, with the annual rate of change, may be obtained from H. O. Chart No. 2406, Variation of the Compass.

Distances are expressed in nautical miles, the mile being approximately 2,000 yards.

Soundings are referred to low water ordinary springs unless otherwise stated.

Heights are referred to mean high water, spring tides.

Details of lights should be taken from the latest light lists and charts, as no attempt has been made to cover these details in this volume.

The return coupons in the front of the book should be sent in at the expiration of the years shown on them.

In the interest of mariners, information regarding inaccuracies in this publication should be sent to the United States Hydrographic Office, Washington, D. C.

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INFORMATION RELATING TO NAVIGATIONAL AIDS AND GENERAL NAVIGATION.

THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

The following publications are issued by the United States Hydrographic Office as guides to navigation: Charts, Chart Catalogues, Sailing Directions, Light Lists, Tide Tables, Notices to Mariners, Pilot Charts, and Hydrographic Bulletins. Of these, the Notices to Mariners and the Hydrographic Bulletins are free to mariners and others interested in shipping. The Pilot Charts are free to contributors of professional information, but are sold to the general public at 10 cents a copy. The other publications of the office are sold under the law at cost price.

The Charts, the Sailing Directions, and the Light Lists are all affected by continual changes and alterations, concerning which information from all parts of the world is published weekly in the Notices to Mariners.

The charts are always corrected for all available information up to the date of issue stamped upon them; and the Light Lists should be noted for the recent alterations and additions. The Sailing Directions, however, can not, from their nature, be so fully corrected, and in all cases where they differ from the charts, the charts must be taken as the guide.

Charts.—When issued from the Hydrographic Office, the charts have received all necessary corrections to date.

All small but important corrections that can be made by hand are given in the Notices to Mariners, and should at once be placed on the charts to which they refer.

Extensive corrections that can not be conveniently thus made are put upon the plates, and new copies are put on sale. Masters of vessels are urged to replace the old charts, which should be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which extensive corrections are made are noted on the chart on the right of the middle of the lower edge; those of the smaller corrections at the left lower corners.

The edition, and corresponding date, of the chart will be found in the right lower corner, outside the outer neat line.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (found in the lower right and upper left corners), in order that the edition of the chart referred to may be known.

The Light Lists are corrected before issue, and all changes are published in the weekly Notices to Mariners.

The navigating officer should make notations in the tabular form in the Light Lists and paste in at the appropriate places slips from the Notices to Mariners.

The Light Lists should always be consulted as to the details of a light, as the description in the sailing directions is not complete, and may be obsolete, in consequence of changes since publication.

The Sailing Directions or Pilots are kept corrected by addenda; and subsequent to date of last addenda, they should be kept corrected by means of the Notices to Mariners. Sailing Directions issued to naval vessels carry with them an envelope containing slips of corrections up to date of issue.

Addenda are published from time to time, and contain a summary of all the information received up to date since the publication of the volume to which they refer, canceling all previous Notices to Mariners.

To enable the books to be more conveniently corrected, addenda and Notices to Mariners are printed on one side only, and two copies of the latter are issued to each naval vessel, one to be cut and the slips pasted in at the appropriate places, the other to be retained intact for reference.

To paste in the slips, as the Notices to Mariners are received, is one of the duties of the navigating officer, demanding faithful attention.

It must, however, be understood that Sailing Directions will rarely be correct in all details, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide, for which purpose, for ordinary navigation, it is sufficient.

The Tide Tables, which are published annually by the United States Coast and Geodetic Survey, give the predicted times and heights of the high and the low waters for every day in the year at 70 of the principal ports of the world, and, through the medium of these by means of tidal differences and ratios, at a very large number of subordinate ports. The tables for the Atlantic and the Pacific coast ports of the United States are also published separately.

It should be remembered that these tables aim to give the times of high and low water, and not the times of turning of the current or of slack water, which may be quite different.

Notices to Mariners, containing fresh information pertaining to all parts of the world, are published weekly and mailed to all

United States ships in commission, Branch Hydrographic offices and agencies, and United States consulates. Copies are furnished free by the main office or by any of the branch offices on application.

With each Notice to naval vessels is sent also a separate sheet, giving the items relating to lights contained in the latest Notice, intended especially for use in correcting the Light Lists.

Pilot Charts of the North Atlantic, Central American Waters, and North Pacific and Indian Oceans are published each month, and of the South Atlantic and South Pacific Oceans each quarter. These charts give the average conditions of wind and weather, barometer, percentage of fog and gales, routes for steam and sailing vessels for the period of issue, ice, and derelicts for the preceding period, ocean currents and magnetic variation for the current year, storm tracks for preceding years, and much other useful information. They are furnished free only in exchange for marine data or observations.

Hydrographic Bulletins, published weekly, are supplemental to the Pilot Charts, and contain the latest reports of obstructions and dangers along the coast and principal ocean routes, ice, derelicts, and wreckage, reports of the use of oil to calm the sea, and other information for mariners. They are to be had free upon application.

THE USE OF CHARTS.

Accuracy of chart.—The value of a chart must manifestly depend upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become.

To judge of a survey, its source and date, which are generally given in the title, are a good guide. Besides the changes that may have taken place since the date of the survey, in waters where sand or mud prevails, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail; until a chart founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbors and their approaches, no surveys yet made have been so thorough as to make it certain that all dangers have been found. The number of the soundings is another method of estimating the completeness of the survey, remembering, however, that the chart is not expected to show all the soundings that were obtained. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

Large or irregular blank spaces among soundings mean that no soundings were obtained in these spots. When the surrounding soundings are deep it may fairly be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch or pinnacle rock.

A wide berth should therefore be given to every rocky shore or patch, and instead of considering a coast to be clear, the contrary should be assumed.

Fathom curves a caution.—Except in charts of harbors that have been surveyed in detail, the 5-fathom curve on most charts may be considered as a danger line or caution against unnecessarily approaching the shore or bank within that line, on account of the possible existence of undiscovered inequalities of the bottom, which only an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for so detailed a survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The 10-fathom curve on rocky shores is another warning, especially for ships of heavy draft.

A useful danger curve will be obtained by tracing out with a colored pencil, or ink, the line of depth next greater than the draft of the ship using the chart. For vessels drawing less than 18 feet the edge of the sanding serves as a well-marked danger line.

Charts on which no fathom curves are marked must especially be regarded with caution, as indicating that soundings were too scanty and the bottom too uneven to enable the curves to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed around, as it is doubtful how closely the spot may have been examined and whether the least depth has been found.

The chart on largest scale should always be used on account of its greater detail and the greater accuracy with which positions may be plotted on it.

Caution in using small-scale charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on one of small scale the same amount of displacement means a large fraction of a mile.

Distortion of printed charts.—The paper on which charts are printed from engraved plates has to be damped. On drying distortion takes place from the inequalities of the paper, which greatly varies with different papers and the amount of the damping; but it does not affect navigation. The larger the chart the greater the amount of this distortion. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted on the chart, especially if the lines to objects be long.

Mercator chart.—Observed bearings are not identical with those measured on the Mercator chart (excepting only the bearings north and south, and east and west on the equator) because the line of sight, except as affected by refraction, is a straight line and lies in the plane of the great circle, while the straight line on the chart (except the meridian line) represents, not the arc of a great circle, but the loxodromic curve, or rhumb line, which on the globe is a spiral approaching but never in theory reaching the pole, or, if the direction be east and west, a circle of latitude.

The difference is not appreciable with near objects, and in ordinary navigation may be neglected. But in high latitudes, when the objects are very distant and especially when lying near east or west, the bearings must be corrected for the convergence of the meridians in order to be accurately placed on the Mercator chart, which represents the meridians as parallel.

On the polyconic chart, since a straight line represents (within the limits of 15 or 20 degrees of longitude) the arc of a great circle or the shortest distance between two points, bearings of the chart are identical with observed bearings.

The mercator projection is unsuited to surveying, for which purpose the polyconic projection is used by the Hydrographic Office and the Coast and Geodetic Survey.

Notes on charts should always be read with care, as they may give important information that can not be graphically represented.

Buoys.—Too much reliance should not be placed on buoys always maintaining their exact positions. They should therefore be regarded as warnings, and not as infallible navigational marks, especially when in exposed places and in the wintertime, and a ship's position should always, when possible, be checked by bearings or angles of fixed objects on shore.

Gas buoys.—The lights shown by gas buoys can not be implicitly relied on; the light may be altogether extinguished, or, if periodic, the apparatus may get out of order.

Whistle and bell buoys are sounded only by the action of the sea; therefore, in calm weather, they are less effective or may not sound.

Lights.—All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of 15 feet for the observer's eye. The effect of a greater or less height of eye can be ascertained by means of the table of distances of visibility due to height, published in the Light Lists.

The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Refraction, too, may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light, the fact may be forgotten that aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be obtained from the standard compass when you lay down from aloft.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip, it may be determined whether the ship is on the circle of visibility corresponding with the usual height of the eye, or unexpectedly nearer the light.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by its candlepower or order, as stated in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range corresponding to its height. Thus, a light standing 200 feet above the sea and recorded as visible only 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the influence of the wind large areas of silence have been found in different directions and at different distances from the origin of sound, even in clear weather; therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly toward the land, and may not be observed by the lighthouse keepers until upon them; a ship may have been for many hours in it, and approaching the land in confidence, depending on the signal, which is not sounded. When sound travels against the wind, it may be thrown upward; a man aloft might then hear it though inaudible on deck.

The submarine bell system of fog signals is much more reliable than systems transmitting sound through the air, as sound traveling in water is not subject to the same disturbing influences; the fallibility of the lighthouse keeper is, however, about the same in all systems, so that caution should be observed even by vessels equipped with submarine-bell receiving apparatus.

Submarine bells have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus may determine the approximate bearing of the signal. These signals may be heard also on vessels not equipped with receiving apparatus by observers below the water line, but the bearing of the signal can not then be readily determined.

Vessels equipped with radio apparatus and submarine bell receivers may fix their distance from a light vessel having radio and submarine bell, utilizing the difference in velocity of sound waves of the radio and the bell. Sound travels 4,794 feet per second at 66° F. in water, and the travel of radio sound waves for practicable distances may be taken as instantaneous.

All vessels should observe the utmost caution in closing the land in fogs. The lead is the safest guide and should be faithfully used.

Tides.—A knowledge of the times of high and low water and of the amount of vertical rise and fall of the tide is of great importance in the case of vessels entering or leaving port, especially when the low water is less than or near their draft. Such knowledge is also useful at times to vessels running close along a coast, in enabling them to anticipate the effect of the tidal currents in setting them on or offshore. This is especially important in fog or thick weather.

The predicted times and heights of the high and low waters, or differences by which they may be readily obtained, are given in the Tide Tables for all the important ports of the world. The height at any intermediate time may be obtained by means of Tables 2A and 2B for most of the principal tidal stations of the United States, given in Table 1, and for the subordinate stations of Table 3 by using them as directed in the Tide Tables. The intermediate height may also be obtained by plotting the predicted times and heights of high and low water and connecting the points by a curve. Such knowledge is often useful in crossing a bar or shallow flats.

Planes of reference.[1]—The plane of reference for soundings on Hydrographic Office charts made from United States Government surveys and on Coast and Geodetic Survey charts of the Atlantic coast of the United States is mean low water; on the Pacific coast of the United States as far as the Strait of Juan Fuca, it is the mean of the lower low waters; and from Puget Sound to Alaska, the plane employed on Hydrographic Office charts is low water ordinary springs.

On most of the British Admiralty charts the plane of reference is the low water of ordinary springs; on French charts, the low water of equinoctial springs.

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[1] The distinction between "rise" and "range" of the tide should be understood. The former expression refers to the height attained above the datum plane for soundings, differing with the different planes of reference; the latter, to the difference of level between successive high and low waters.

In the case of many charts compiled from old or various sources the plane of reference may be in doubt. In such cases, or whenever not stated on the chart, the assumption that the reference plane is low water ordinary springs gives a larger margin of safety than mean low water.

Whichever plane of reference may be used for a chart it must be remembered that there are times when the tide falls below it. Low water is lower than mean low water about half the time, and when a new or full moon occurs at perigee the low water is lower than the average low water of springs. At the equinoxes the spring range is also increased on the coasts of Europe, but in some other parts of the world, and especially in the Tropics, such periodic low tides may coincide more frequently with the solstices.

Wind or a high barometer may at times cause the water to fall below even a very low plane of reference.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can not be depended upon and additional caution is necessary.

Mean sea level.—The important fact should be remembered that the depths at half tide are practically the same for all tides, whether neaps or springs. Half tide therefore corresponds with mean sea level. This makes a very exact plane of reference, easily found, to which it would be well to refer all high and low waters.

The Tide Tables give in Table 3, for all the ports, the plane of reference to which tidal heights are referred and its distance below mean sea level.

If called on to take special soundings for the chart at a place where there is no tidal bench mark, mean sea level should be found and the plane for reductions established at the proper distance below it, as ascertained by the Tide Tables, or by observations, or in some cases, if the time be short, by estimation, the data used being made a part of the record.

Tidal streams.—In navigating coasts where the tidal range is considerable, especial caution is necessary. It should be remembered that there are indrafts to all bays and bights, although the general run of the stream may be parallel with the shore.

The turn of the tidal stream offshore is seldom coincident with the times of high and low water on the shore. In some channels the tidal stream may overrun the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The effect of the tidal wave in causing currents may be illustrated by two simple cases.

(1) Where there is a small tidal basin connected with the sea by a large opening.

(2) Where there is a large tidal basin connected with the sea by a small opening.

In the first case the velocity of the current in the opening will have its maximum value when the height of the tide within is changing most rapidly, i. e., at a time about midway between high and low water. The water in the basin keeps at approximately the same level as the water outside. The flood stream corresponds with the rising and the ebb with the falling of the tide.

In the second case the velocity of the current in the opening will have its maximum value when it is high water or low water without, for then there is the greatest head of water for producing motion. The flood stream begins about three hours after low water, and the ebb stream about three hours after high water, slack water thus occurring about midway between the tides.

Along most shores not much affected by bays, tidal rivers, etc., the current usually turns soon after high water and low water.

The swiftest current in straight portions of tidal rivers is usually in the middle of the stream, but in curved portions the most rapid current is toward the outer edge of the curve, and here the water will be deepest. The pilot rule for best water is to follow the ebb tide reaches.

Countercurrents and eddies may occur near the shores of straits, especially in bights and near points. A knowledge of them is useful in order that they may be taken advantage of or avoided.

A swift current often occurs in a narrow passage connecting two large bodies of water, owing to their considerable difference of level at the same instant. The several passages between Vineyard Sound and Buzzards Bay are cases in point. In the Woods Hole passage the maximum strength of the tidal streams is at about half tide.

Tide rips are made by a rapid current setting over an irregular bottom, as at the edges of banks where the change of depth is considerable.

Current arrows on charts show only the most usual or the mean direction of a tidal stream or current; it must not be assumed that the direction of a stream will not vary from that indicated by the arrow. The rate, also, of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

FIXING POSITION.

Sextant method.—The most accurate method available to the navigator of fixing a position relative to the shore is by plotting with a protractor, sextant angles between three well-defined objects on shore which are shown on the chart; this method, based on the "three-point problem" of geometry, should be in general use.

For its successful employment it is necessary: First, that the objects be well chosen; and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice. Two observers are better for this method.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn.

On the other hand distant objects should be used for direction, because less affected by a small error or change of position.

The three-arm protractor or station pointer consists of a graduated brass circle with one fixed and two movable radial arms, the three beveled edges of the arms, if produced, intersecting at the exact center of the instrument. The edge of the fixed arm marks the zero of the graduation which enables the movable arms to be set at any angles with the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole.

The transparent xylonite protractor is an excellent substitute for the brass instrument and in some cases preferable to it, as when, for instance, the objects angled on are so near the observer that they are more or less hidden by the circle of the instrument. The xylonite protractor also permits the laying down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through three objects (in which case the sum of the observed angles equals the supplement of the angle at the middle object made by lines from the other two) it will be indeterminate, as it will plot all around the circle. Such an observation is called a "revolver." An approach to this condition must be avoided. Near objects are better than distant ones, and, in general, up to 90° the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation.

A single angle and a range of two objects give in general an excellent fix, easily obtained and plotted.

Advantages of sextant method.—In many narrow waters where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by its means. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might under such circumstances put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal, or of fresh soundings or new buildings as additions to the chart, the sextant should invariably be used. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. If a round of angles can be taken the observer's accuracy is also checked. In the case of ordinary soundings a third angle need be taken only occasionally; first, to check the general accuracy of the chart, as above stated; second, to make certain that the more important soundings, as at the end of a line, are correctly placed.

If communication can be had with the shore, positions may be fixed with great accuracy by occupying with theodolite or sextant two known points of the chart. The third angle of the triangle, that between the two points at the position sought, should be measured as a check.

The compass.—It is not intended that the use of the compass to fix the ship should be given up; in ordinary piloting the compass, with its companion, the pelorus, may be usefully employed for this purpose, although less accurate than the sextant.

If the accuracy of the chart is doubtful, the compass should be used in preference to the sextant.

In fixing by the compass, it should always be remembered that a position by two bearings only, like that by two angles only, is liable to error. An error may be made in taking a bearing, or in applying to it the deviation, or in laying it on the chart. A third or check bearing should, therefore, be taken of some other object, especially when near the shore or dangers. A common intersection for the three lines assures accuracy.

When the three lines do not intersect in a point, the following rule holds: If the line drawn to the middle object falls to the right of the point of intersection of the lines to the two outside objects, the position of the observer was to the right of the line to the middle object; and if it falls to the left of the intersection his position was to the left of the line. Thus it will be seen that the assumption, that the position is at the center of the triangle formed by the intersecting lines, is incorrect.

Doubling the angle on the bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing," the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy, and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam before the position is obtained.

By taking the bearings at two points and four points on the bow, a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current. Taking afterwards the beam bearing gives, with slight additional trouble, the distance of the object when abeam; such beam bearings and distances, with the times, should be continuously recorded as fresh departures, the importance of which will be appreciated in cases of being suddenly shut in by fog.

When the first bearing is 26½° from ahead, and the second 45°, the run between bearings will equal the distance at which the object will be passed abeam.

A table of multipliers of the distance run in the interval between any two bearings of an object, the product being its distance at the time of the second bearing, is given in the Light Lists and in Bowditch.

Danger angle.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten. In employing the horizontal danger angle, however, caution is necessary, as should the chart be inaccurate, i. e., should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

The vertical danger angle may be conveniently used when passing elevated points of known heights, such as lighthouses, cliffs, etc. The computation of the distance corresponding to the height of the object and its angular elevation requires for small distances merely the solution of a plain right triangle; the natural cotangent of the angle multiplied by the height in feet gives the distance in feet. The convenient use of this method, however, requires tables such as those published by Capt. Lecky in his little book entitled "The Danger Angle and Offshore Distance Tables." This book very usefully extends the vertical angle method to finding a ship's position at sea by observing the angular altitude of a peak of known height and its bearing. The tables give heights up to 18,000 feet and distances up to 110 miles.

When the angles are not too large they should be observed "on and off the limb" and the index error of the sextant thus eliminated, in preference to correcting for it the single altitude. It must be remembered that in high latitudes the bearing of a distant object needs correction for the convergence of the meridians before being laid down on a Mercator chart. The correction may be found by the following formula, using the approximate position: The sine of the correction equals the product of the sine of half the difference of longitude by the sine of the middle latitude. It is applied on the equatorial side of the observed bearing and its effect is always to increase the latitude of the observer.

Soundings taken at random are of little value in fixing or checking position and may at times be misleading. In thick weather, when near or closing the land, soundings should be taken continuously and at regular intervals, and, with the character of the bottom, systematically recorded. By laying the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship, and then moving the paper over the chart, keeping the line representing the track parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined. This plan was suggested by Lord Kelvin, whose admirable sounding machine renders the operation of sounding possible in quite deep water, without slowing down the ship and consequent loss of time.

Pelorus.—All ships should be supplied with the means of taking accurate bearings both by night and by day. The standard compass is not always conveniently placed for the purpose; in such case a pelorus will be very useful, but the results are not as accurate as those obtained direct from the compass. The utility of such an instrument in ascertaining the change of bearing of an approaching ship should not be overlooked.

Position lines.—Among the various methods of fixing position at sea, the one which should be best understood and put to the most constant use is that employing position or Sumner lines. These lines give the most comprehensive information to the navigator with the least expenditure of labor and time. The knowledge gained is that the vessel must be somewhere on the line, provided the data used is accurate and the chronometer correct. As the information given by one line of position is not sufficient to determine the definite location of the vessel, it is necessary to cross this line by another similarly obtained, and the vessel being somewhere on both must be at their intersection. However, a single line, at times, will furnish the mariner with invaluable information; for instance, if it is directed toward the coast, it marks the bearing of a definite point on the shore, or if parallel to the coast it clearly indicates the distance off, and so will often be found useful as a course. A sounding taken at the same time with the observation will in certain conditions prove of great value in giving an approximate position on the line.

The easiest and quickest way to establish a line of position is by employing the method of Marcq St. Hilaire, as modified by the use of tables of altitude. The principle of this method is one of altitude differences, in which the observed altitude is compared with the computed altitude for a dead reckoning, or other selected position, and the difference in minutes of latitude measured toward the body along the line of its azimuth, if the observed altitude is greater than the computed altitude, and vice versa. A line drawn at right angles to the line of azimuth through the point thus determined is the position line, somewhere upon which will be found the position of the vessel. The tables of altitude obviate the computation of the altitude and thereby greatly facilitate the establishment of the line.

A position line may also be found by computing two positions for longitude with two assumed latitudes, and drawing the line between them; or by drawing to the position obtained with one latitude a line at right angles to the bearing of the body as taken from the azimuth tables.

A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The position lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterward or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day and in combination with the sun gives an excellent fix.

The morning and evening twilight observations, besides their great accuracy, possess the additional advantage of greatly extending the ship's reliable reckoning beyond the limits of the ordinary day navigation, and correspondingly restricting the dead reckoning uncertainties of the night. An early morning fix in particular is often of great value. Though the same degree of accuracy as at twilight can not be expected, night observations are very valuable and should be assiduously practiced.

Piloting.—The navigator, in making his plan for entering a strange port, should give very careful previous study to the chart and sailing directions, and should select what appear to be the most suitable marks for use, also providing himself with substitutes to use in case those selected as most suitable should prove unreliable in not being recognized with absolute certainty. Channel buoys seen from a distance are difficult to identify, because their color is sometimes not easily distinguished and they may appear equally distant from the observer even though they be at widely varying distances. Ranges should be noted, if possible, and the lines drawn, both for leading through the best water in channels, and also for guarding against particular dangers; for the latter purpose safety bearings should in all cases be laid down where no suitable ranges appear to offer. The courses to be steered in entering should also be laid down and distances marked thereon. If intending to use the sextant and danger angle in passing dangers, and especially in passing between dangers, the danger circles should be plotted and regular courses planned, rather than to run haphazard by the indications of the angle alone, with the possible trouble from bad steering at critical points.

The ship's position should not be allowed to be in doubt at any time, even in entering ports considered safe and easy of access, and should be constantly checked, continuing to use for this purpose those marks concerning which there can be no doubt until others are unmistakably identified.

The ship should ordinarily steer exact courses and follow an exact line, as planned from the chart, changing course at precise points, and, where the distances are considerable, her position on the line should be checked at frequent intervals. This is desirable even where it may seem unnecessary for safety, because if running by the eye alone and the ship's exact position be immediately required, as in a sudden fog or squall, fixing at that particular moment may be attended with difficulty.

The habit of running exact courses with precise changes of course will be found most useful when it is desired to enter port or pass through inclosed waters during fog by means of the buoys; here safety demands that the buoys be made successively, to do which requires, if the fog be dense, very accurate courses and careful attention to the times, the speed of the ship, and the set of the current; failure to make a buoy as expected leaves, as a rule, no safe alternative but to anchor at once, with perhaps a consequent serious loss of time.

In passing between dangers where there are no suitable leading marks, as, for instance, between two islands or an island and the main shore, with dangers extending from both, a mid-channel course may be steered by the eye alone with great accuracy, as the eye is able to estimate very closely the direction midway between visible objects.

In piloting among coral reefs or banks, a time should be chosen when the sun will be astern, conning the vessel from aloft or from an elevated position forward. The line of demarcation between the deep water and the edges of the shoals, which generally show as green patches, is indicated with surprising clearness. This method is of frequent application in the numerous passages of the Florida Keys.

Changes of course should in general be made by exact amounts, naming the new course or the amount of the change desired, rather than by ordering the helm to be put over and then steadying when on the desired heading, with the possibility of the attention being diverted and so of forgetting in the meantime, as may happen, that the ship is still swinging. The helmsman, knowing just what is desired and the amount of the change to be made, is thus enabled to act more intelligently and to avoid bad steering, which in narrow channels is a very positive source of danger.

Coast piloting involves the same principles and requires that the ship's position be continuously determined or checked as the landmarks are passed. On well-surveyed coasts there is a great advantage in keeping near the land, thus holding on to the marks and the soundings, and thereby knowing at all times the positions rather than keeping offshore and losing the marks, with the necessity of again making the land from vague positions, and perhaps the added inconvenience of fog or bad weather, involving a serious loss of time and fuel.

The route should be planned for normal conditions of weather, with suitable variations where necessary in case of fog or bad weather or making points at night, the courses and distances, in case of regular runs over the same route, being entered in a notebook for ready reference, as well as laid down on the chart. The danger circles for either the horizontal or the vertical danger angles should be plotted, wherever the method can be usefully employed, and the angles marked thereon; many a mile may thus be saved in rounding dangerous points with no sacrifice in safety. Ranges should also be marked in, where useful for position or for safety, and also to use in checking the deviation of the compass by comparing in crossing, the compass bearing of the range with its magnetic bearing, as given by the chart.

Changes of course will in general be made with mark or object abeam, the position (a new "departure") being then, as a rule, best and most easily obtained. The pelorus should be at all times in readiness for use, and the chart where it may be readily consulted by the officer of the watch. The sextant should also be kept conveniently at hand.

A continuous record of the progress of the ship should be kept by the officer of the watch, the time and patent-log reading of all changes of course and of all bearings, especially the two and four point bearings, with distance of object when abeam, being noted in a book kept in the pilot house for this especial purpose. The ship's reckoning is thus continuously cared for as a matter of routine and without the presence or particular order of the captain or navigating officer. The value of thus keeping the reckoning always fresh and exact will be especially appreciated in cases of sudden fog or when making points at night.

Where the coastwise trip must be made against a strong head wind, it is desirable, with trustworthy charts, to skirt the shore as closely as possible in order to avoid the heavier seas and adverse current that prevail farther out. In some cases, with small ships, a passage can be made only in this way. The important saving of coal and of time, which is even more precious, thus effected by skillful coast piloting makes this subject one of prime importance to the navigator.

Change in the variation of the compass.[1]—The gradual change in the variation must not be forgotten in laying down on the chart courses and bearings. The magnetic compasses placed on the charts for the purpose of facilitating the plotting become in time slightly in error, and in some cases, such as with small scales or when the lines are long, the displacement of position from neglect of this change may be of importance. The date of the variation and the annual change, as given on the compass rose, facilitate corrections when the change has been considerable. The compasses are reengraved once in ten years; more frequent alterations on one spot in a copperplate would not be practicable.

The change in the variation is in some parts of the world so rapid as to need careful consideration, requiring a frequent change of the course. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles.

Local magnetic disturbance of the compass on board ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that disturbance of the compass in a ship afloat is experienced in only a few places on the globe.

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[1] See H. O. Chart No. 2406, Variation of the compass.

Magnetic laws do not permit of the supposition that the visible land causes such disturbance, because the effect of a magnetic force diminishes so rapidly with distance that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong, the compass may be temporarily deflected when passing over such a spot; but the area of disturbance will be small unless there are many centers near together.

Use of oil for modifying the effect of breaking waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skillfully applied, may prevent much damage both to ships, especially of the smaller classes, and to boats by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:

1. On free waves, i. e., waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when no other oil is obtainable, or it may be mixed with other oils; all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. In cold water, the oil, being thickened by the low temperature and not being able to spread freely, will have its effect much reduced, a rapid-spreading oil should be used.

5. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

6. It is useful in a ship or boat either when running, or lying-to, or in wearing.

7. When lowering and hoisting boats in a heavy sea the use of oil has been found greatly to facilitate the operation.

8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags, capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to permit leakage. The waste pipes forward are also very useful for this purpose.

9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan.

On a bar, with the ebb tide running, it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside, bearing in mind that her natural tendency is always to forge ahead. If she is aground the effect of oil will depend upon attending circumstances.

11. For a boat riding in bad weather to a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat, and the bag readily hauled on board for refilling, if necessary.

CHAPTER I.

GENERAL REMARKS—CAPE OF GOOD HOPE PROVINCE—NATAL—PORTUGUESE EAST AFRICA—GERMAN EAST AFRICA—BRITISH EAST AFRICA—ZANZIBAR AND PEMBA—ITALIAN EAST AFRICA—WINDS AND WEATHER—BAROMETER—CURRENTS—TEMPERATURE—ICE—BUOYAGE—TIDES—VARIATION OF THE COMPASS—LLOYD'S SIGNAL STATIONS—LIFE-SAVING STATIONS—NAVAL ESTABLISHMENTS—COAL—DOCKS—PASSAGES.

General remarks.—The south, southeast, and east coasts of Africa, described in this work, commencing at the Cape of Good Hope, have a coastline of about 4,250 miles, to Ras Hafun, and include the following political divisions:

Union of South Africa, extending from the Cape of Good Hope to about 2½ miles northward of the Kosi River, or between latitude 34° 21′ and 26° 51′ south, includes within its limits the following British territories: Cape of Good Hope, which stretches on the southwest coast of Africa as far as the Orange River, and on the south as far as the Umtamvuna River, the boundary between it and Natal, which latter, with Zululand, extends for 360 miles northeastward to the northeast boundary of the Province, separating it from Portuguese territory. In addition to these the Province also includes the Transvaal and Orange Free State, both without seaboard.

Portuguese East Africa extends northeastward and northward to its boundary with German East Africa, in latitude 10° 40′ south, the latter division stretching northward to the Umba River, in latitude 4° 41′ south, which forms the southern boundary of the East African Protectorate, another area of British territory, also including the islands of Zanzibar and Pemba, and extending to the Mto Ya Vumbu in latitude 0° 15′ south, from which the remainder of the coastline is in the Italian sphere, reaching to the British Protectorate on the Somali coast. Within the east coast are the British territories of Rhodesia, Nyasaland, and Uganda.

Cape of Good Hope Province, from its northern boundary of the Orange River and the German protectorate, stretches southward between latitude 26° and 34° 50′ south, a distance of about 550 miles, and from the southwest coast of Africa eastward, between longitude 16° 25′ and 30° 0′ east for nearly 750 miles; it has an area of 276,995 square miles, and a coastline of nearly 1,200 miles. The west coast of the Province is described in Africa Pilot, Part I.

The cape itself was discovered in 1486 by Bartholomew Diaz, a Portuguese commander, sent by the King of Portugal to discover an ocean route to India, it being named by its discoverer Cabo Tormentoso, or Stormy Cape, but King John II, of Portugal, convinced of its being the turning point to the route to India, named it Boa Esperanca, or Cape of Good Hope. Diaz only rounded the cape and returned home, but in 1497 Vasco da Gama not only rounded it, but landed in what is now known as Natal.

From this, until 1652, no permanent settlement was made at the cape, but it was used by British, Portuguese, and Dutch vessels as a place of call when proceeding to and from the East Indies; in the latter year the territory was taken possession of by the Dutch East India Co., under Van Riebeck, who built a fort with a view to providing supplies for their vessels when passing, and it remained in their hands until 1795, when it passed to the British Government, who held it until the peace of Amiens, in 1802, when it was restored to the Dutch, but in 1806 the British again took possession, and it was formally ceded to them in 1814.

The government of the whole Union of South Africa is constituted under the South Africa act of 1909, the self-governing colonies of the Cape of Good Hope, Natal, the Transvaal, and Orange River colony being united under one government in 1910, with the seat of the Government at Pretoria, and that of the legislature at Cape Town. The executive is vested in a Governor General, appointed by the sovereign, aided by an executive council, with a legislature of two houses.

Physical features.—Directly south of the Orange River, on the west coast, the country consists of a series of terraces, divided by mountain ranges, varying in height from 4,000 to 8,000 feet, rising gradually from south to north as far as the parallel of 32° south, and gradually descending in a series of open sterile plains to the river, the highest summit being Spitzkop or Compass Berg; the passages from one plateau to another are by well-made passes through narrow and difficult gorges or kloofs.

The southwest peninsula contains Table Mountain, 3,582 feet high, and the Groote Zwarte Bergen and Lange Bergen run in parallel lines from west to east of the southern Province, having between them and the Roggeveld and Nieuweveld, on the north, the Great

Karoo plateau, 300 miles in length in an east and west direction, and 70 miles in breadth, bounded on the east by Sneeuwbergen, and containing the highest summit, already mentioned; this plateau is a dry, barren district, but immediately after heavy rains it is covered by profuse and varied vegetation. The ranges in the east join the Drakensbergen, between Natal and Orange Free State.

Mountains.—The principal mountain ranges are Olifants Zitzikama, the summit of which is Great Winterhoek, 6,818 feet high; Groote Zwarte Bergen, its highest peak being the Cockscomb Mountain, 5,773 feet, and the Roggeveld Sneeux Bergen Range, having Compass Berg, 8,209 feet, already mentioned.

Rivers, although numerous, are practically useless for either navigation or irrigation, most of them flowing through deep and precipitous ravines and being, except when swollen by rains, mere shallow torrents. Bars, which front the mouths of the largest, in most cases make entrance both difficult and dangerous, but some of these have been rendered navigable. The principal rivers are the Orange and Olifant, the former rising near Mont aux Sources, in Basutoland, draining 400,000 square miles of country.

Flora and fauna.—South Africa is greatly destitute of forest except in lower valleys and coast regions. In the plains the fleshy, leafless, contorted species of kapsias, mesembryanthemums, aloes, and other succulent plants are found, and there is also some valuable timber, the trees being yellow pine (*Podocarpus elongatus*), stinkwood (*Ocotea*), sneezewood or Cape ebony (*Pteroxylon utile*), and ironwood. Extensive miniature woods or heaths are found in endless variety, covered throughout the greater part of the year with innumerable blossoms, red being prevalent; alfa, the most abundant of all the grasses, grows in the plateaus of the Atlas Range.

The indigenous animals are fast disappearing, but buffaloes are found on the south coast, and the springbok is abundant. The ostrich, the secretary bird, the francolin, and the guinea fowl are common, while the weaver bird is found in the southern part. Amongst reptiles are a number of venomous snakes. The bite of the tsetse fly is fatal to most animals.

Population.—In 1911 the population of the Cape of Good Hope Province was 2,564,965, and of these 582,377 were Europeans; Cape Town, the capital, with its suburbs, had a population of 149,461 in the same year.

The Bushmen, small in stature and of the lowest class of humanity, are the earliest known inhabitants, but the Bechuanas and Hottentots endeavored to exterminate them, and the latter, nomadic and pastoral in their habits, once dominated the colony but are now nearly extinct as a pure race.

The Griquas, a thin wiry race, of medium height, and also of pastoral habits, are the result of cross-breeding between the Boers and Kaffirs, the latter a fine, tall, muscular, intelligent race, also with pastoral proclivities.

Products.—The eastern and southern portions of the Province are generally well wooded, and extremely fertile, having an abundant water supply, and in 1911 there were 463,936 acres under cultivation, 2,764,603 acres under grazing, and 179,603 acres fallow. Cattle, horses, sheep, goats, pigs, mules, asses, and ostriches are reared, and the principal crops are wheat, oats, maize, pumpkins and tobacco. Diamonds, copper, and salt are the chief minerals from this Province, and only a comparatively small quantity of coal is mined.

Trade.—In 1912 the diamond mines of the Province of Cape of Good Hope yielded 2,325,549 carats, of an aggregate value of $30,125,240, and 16,951 tons of copper matte and ore were valued at $2,471,129, while 19,844 tons of salt amounted to $139,809; the amount of coal mined in the same year was 74,701 tons.

Ports.—There are good harbors at Simons Bay, Port Elizabeth, East London, and Mossel Bay, receiving artificial protection, as there are no natural harbors or sheltered anchorages for large vessels, and the coast, being exposed to the swell of the Southern Ocean, is dangerous, especially for sailing vessels, as also is landing, which is difficult even from anchorages.

Communications—Steamships.—Cape Town is 5,979 miles from Southampton, the time occupied being usually 16 days. The principal line calling at the Cape is the Union Castle Mail Steamship Co., leaving Southampton every Saturday.

Railways.—The railways, mostly the property of the Union Government, consist of the Western Division, which, starting from Cape Town, runs northeastward to Vryburg, a distance of 774 miles, with branches northward to Vredenburg and Olifants River, southward to Simons Town, and southeastward to Kydosdie, via Caledon; a branch also runs southeastward to Mossel Bay. The Midland Division, from Port Elizabeth, joining the Western Division at De Aar Junction, 339 miles, and having branches at Naauwpoort and at Norvals Pont Junction, 270 and 329 miles, respectively, from Port Elizabeth, with other branches; at the latter place what was before known as the Central South African Railway commences.

The Eastern Division runs from East London to Springfontein, a distance of 314 miles, connecting with the other main lines from the Western and Middle Divisions. The Eastern Division has two branch lines connecting with the Midland main line and three branches extending toward the Natal system.

The line connecting Cape Town with Simons Town, via Wynberg, is about 20 miles in length, and a private line of 3¾ miles runs from

Cape Town to Sea Point. In 1912 there were 3,492 miles of railway open for traffic in the Cape of Good Hope Province.

Telegraph.—Cape Town is connected with Europe and with North and South America by two submarine cables. One of the cables touches at Swakopmund (Walfisch Bay), Mossamedes, Benguela, St. Paul de Loando, San Thome, Princes Island, and various places along the African coast and the Canary Islands. The other cable reaches these continents via St. Helena, Ascension, Cape de Verde Islands, and the Azores.

Land wires connect the Cape with Port Nolloth, on the west, and with Mossel Bay, Port Elizabeth, East London, and other places on the south coast, and following the line of the railway a wire reaches Fort Johnson, at the south end of Lake Nyasa, and skirting the west side of that lake, crosses to Kituta at the south end of Lake Tanganyika. In 1912 there were 56,860 miles of telegraph and 54,997 miles of telephone wire in operation in South Africa.

Radio station.—A radio station is situated on Slang Kop Point, 15½ miles northwestward of the Cape of Good Hope.

Roads, which are numerous, but unmetaled except in or near large towns, are exceedingly heavy in consequence during the wet season.

Climate.—Owing probably to the uniformity of temperature, the Province of the Cape of Good Hope possesses a healthy climate, which is much favored by Europeans suffering from pulmonary complaints. Summer commences in November and continues until April, the mean temperature at Cape Town being about 76° in February, and 59° in July.

In the western portion of the Province, as far eastward as Cape St. Francis, the rainy season is during winter, the rains being due to the westerly winds from the South Atlantic, smart showers beginning about March, increase gradually up to June, which although usually the wettest month, has a fair proportion of fine weather. From June the rain decreases until October, and December and January are dry months.

Eastward of Cape St. Francis the rainy season is in summer, and the neighborhood of that cape, lying between the winter and summer rains, has a fall nearly equally distributed throughout the year, but at Port Elizabeth the greatest quantity falls between July and December.

The average rainfall at Cape Town is 23 inches, at Mossel Bay 14 inches, and at Port Elizabeth 22 inches, but inland it is generally less, being 14 inches at Worcester, 50 miles from Cape Town, and 8 inches the same distance inland from Mossel Bay. On Table Mountain, at McLears Beacon, 20 years' observations give a rainfall of 73.4 inches in 1896, the dryest year, and 126.2 inches in 1902, the wettest year, a fall of 36.58 inches being recorded in the month of August, 1899.

Natal.—The next division northeastward of Cape of Good Hope Province, and including Zululand and Amatougaland, has an area of 44,000 square miles, and a coast line of 360 miles, extending to about 2¼ miles northward of the Kosi River, the southern boundary of Portuguese possessions.

Deriving its name from having been discovered on Christmas Day, 1497, by the celebrated Portuguese navigator Vasco da Gama, it was first settled in 1824 by a small party of British subjects, who landed on the coast where Durban now stands, but two unsuccessful attempts at forming a settlement were previously made by the Dutch. The country, at the time of its settlement, formed a part of the great Zulu Kingdom, under T'Chaka.

Between 1835 and 1837 large parties of Dutch Boers from what was then Cape Colony trekked across country and established themselves in the northern part of Natal, where to this day the Boers predominate. In the year 1844 it was proclaimed as British and annexed to Cape Colony, but in 1856 it was made a separate colony, with representative institutions, and in 1893 acquired responsible government; in 1910 it became part of the Union of South Africa. Zululand was annexed in 1897.

The Government is administered by an administrator, assisted by a provincial council of 25 members, who are elected for 3 years; there is also an executive committee of 4 members.

Physical features.—Inland from the coast the country forms a series of five almost regular steppes, rising from sea level to an altitude of 12,000 feet in a little more than 100 miles, the first of these from the sea extending about 14 miles inland, and attaining a height of about 1,000 feet; the second steppe, with a breadth of 20 miles, extending 34 miles from the sea, is about 2,500 feet; the third, 25 miles in breadth, is about 3,700 feet; the fourth, about the same breadth, 5,000 feet. The fifth and last attains 6,000 feet, and from it rise Champagne Castle or Cathkin Peak, 12,000 feet; Giants Castle, 11,000 feet; Mont aux Sources, of the same height; Tintwa, 7,500 feet; and the Amajuba, 7,000 feet high, being peaks of the Drakensberg, frequently clad with snow. The Province has pastoral lowlands and rich agricultural land between the slopes of the Drakensberg, and the scenery is in many parts extremely picturesque.

Rivers.—The principal rivers are the Umzimkulu, the Umkomass, and the Tugela, which traverse the Province from the Drakensberg Mountains to the sea, but only the two last are navigable, and that by small craft for a short distance. The Tugela, rising in the Drakensberg, falls over a precipice 1,800 feet high, and after a course of about

200 miles discharges into the sea about 45 miles northeastward of Port Natal; it is said to be the most picturesque of the Natal rivers, and the falls even more so than those of Victoria on the Zambezi. About 32 less important streams, none of which are navigable, run into the sea on the Natal coast.

Population.—In 1911 the population of Natal was 1,194,043, which included 98,114 Europeans and 133,439 Indians and Asiatics. Pietermaritzburg, the capital and seat of the provincial Government, is situated 54 miles inland from Port Natal, and had a population of 30,555 in the same year.

Products.—The coast region, extending about 15 miles inland, is highly fertile, and sugar, coffee, tea, indigo, arrowroot, ginger, tobacco, rice, pepper, and cotton thrive well, while pineapples ripen in the open air. The following are the principal products in the order given: Coal, wool, sugar, maize, bark, skins and hides, tea, and whale products. The midland district is more adapted to cereals and other European crops, and the upper district is chiefly grazing land, where sheep, goats, pigs, cattle, and horses are reared, and amounted to the following numbers in 1911: Sheep, 1,519,258; goats, 989,274; cattle, 456,087; pigs, 110,332.

Coal, the chief mineral product, amounted to 2,608,408 tons in 1913, of which 1,196,460 tons were bunkered and 355,901 tons shipped as cargo at Durban. Salt totaled 19,844 tons in the same year; there are beds of iron ore and a small quantity of copper, while the yield of gold was only 1,242 ounces in 1912. Patent fuel is manufactured at Durban, the average production being 5,000 tons monthly.

Ports.—Durban or Port Natal, completely landlocked, is the only harbor for large vessels, and small coasting steamers can use Port Shepstone at the mouth of the Umzimkulu River, both artificial; the Umkomass River is available for small craft.

Landing on the Natal coast is extremely difficult and dangerous at most times, and continues so as far northeastward as Delagoa Bay.

Communications—Steamships.—Durban is 6,800 miles from Southampton, the time occupied on passage being about 20 days. Steam vessels of the Union Castle Mail Steamship Co. call weekly.

Railways.—The main line of railway from Durban runs to Pietermaritzburg, a distance of 73 miles, thence via Ladysmith to Johannesburg and Pretoria, Johannesburg being 483 miles from Durban; a line from Ladysmith also runs westward to Kroonstad. There are branch lines to Somkele, known as the North Coast Line; to Port Shepstone, named the South Coast Line; to Mid Illovo and to Richmond; also to Vryheid via Glencoe Junction. In 1912 there were 1,053 miles of railway in operation in this Province.

Telegraph.—A submarine cable from Port Natal connects with Aden via Delagoa Bay, Beria, Kiliman, Mozambique, and Zanzibar, and another cable is laid to Mauritius, from which a cable connects to the north with Seychelles and Zanzibar, and another to the east with Rodriguez and thence to Batavia, via the Cocos Islands. A land line skirts the south coast, passing through East London, Port Alfred, Port Elizabeth, Cape St. Francis, Plettenberg Bay, and Mossel Bay to the Cape of Good Hope, with several branches connecting it with the main systems of South Africa.

Radio station.—A radio station at Durban is open to the public at all times.

Uniform time.—The standard time kept in the Union of South Africa is that of the meridian of 30° east or two hours fast of Greenwich mean time.

Climate.—The climate of the sea coast, although almost tropical, is extremely healthy, the summer heat being tempered by clouds and rain, whereas in winter the sky is usually cloudless; May, June, and July are the finest months, with regular land and sea breezes. Frost in winter sometimes occurs at sea level on the coast, and snowstorms are experienced yearly in the uplands, covering the peaks of the Drakensberg.

At Pietermaritzburg, 2,218 feet above sea level, the average yearly temperature is about 64°, rising on rare occasions in summer to 98° and sometimes falling in winter to 28° F., and at Durban these values are about 69½°, 98°, and 42°, respectively, but the daily range does not exceed 20°.

The wet season is from October to February, the wind then being usually from the westward, but rain occurs at all seasons, and thunder and hail storms are of frequent occurrence from October to April. The annual rainfall at Durban amounts to about 40 inches, rain falling on an average of 61 days, and at Pietermaritzburg it is about 38 inches, falling on 58 days on an average. The average fall in every summer month is about 5 inches and in every winter month 2 inches.

Trade.—The returns of trade and shipping are only given for the whole Province of the Union of South Africa, so that separate details are not available. The principal export, as regards value, is gold, which in 1912 was valued at $186,106,524, more than half of the value of the exports, which was $340,494,530. Diamonds come next, with a total value of $44,540,035, and the remainder of the chief exports are wool, ostrich feathers, and coal, of which latter 8,117,078 tons were raised, 4,751,850 tons of this coming from the Transvaal.

Other exports were hides and skins, mohair, copper (principally from the Cape of Good Hope Province), bark wattle, tin ore (entirely from the Transvaal), whale oil, fruits, fish, fodder, buchu leaves, wines, sugar, tobacco, asbestos, and dynamite. Of these 91.4 per cent was shipped to the United Kingdom.

The imports, which in the same year had an aggregate value of $188,990,379, were principally food and drink, cotton manufactures, apparel, machinery, hardware, leather manufactures, haberdashery, wood and timber, iron and steel, drugs and chemicals, woolen manufactures, oils, furniture, glycerin, bags, agricultural implements, electrical wire and fittings, arms and ammunition, hats and caps, candle wax, and tobacco.

In the same year the ports of the Union were entered by 4,349 vessels of an aggregate tonnage of 21,550,615 tons.

The manufactures in the Union Province consist of furniture and soap making, lobster canning, cement, leather, matches, pottery, dynamite, starch, arrowroot, sugar, tea, rope, woolen cloth, salt, etc.

Money.—The currency of the Union of South Africa is the same as in Great Britain, but accounts are sometimes kept in shillings, equal to 8½ cents, and rixdollars, equal to about 36 cents.

Weights and measures are partly those of Great Britain and partly old Dutch.

Morgen=2.11654 acres.

Rheinland fuss=1.03 feet.

The aam of 2 ankers, of 2 steeknen, of 8 stoopen, of 2 meugeln, of 2 pintjes, of 4 maajes=34.16 gallons.

Old Amsterdam pfund=1.32 pounds troy, or 1.09 pounds avoirdupois.

Ninety-two old Amsterdam pfunds=100 pounds avoirdupois.

A muid of wheat, peas, or beans=200 pounds.

A muid of oats or potatoes=150 pounds.

A muid of barley=160 pounds.

A muid of oninons=120 pounds.

One ton=2,000 pounds.

Portuguese East Africa.—From the northern boundary of Zululand to latitude 10° 40′ south, near Cape Delgado, is the seaboard of Portuguese East Africa, about 1,400 miles in length, its boundary on the northeast being German East Africa; on the west it is bounded by Rhodesia and the Transvaal and on the northwest by the British Central Africa protectorate, the total area of Portuguese territory being about 298,000 square miles.

The territory being famed for its gold, the Portuguese first took possession from the Arabs in 1497, and in 1508 they built a fort at the Port of Mozambique, the town which grew up being made into the capital of the Province in 1813; but by a decree of 1891 the Province was constituted the State of East Africa and divided into two Provinces, that of Mozambique, northward of the Zambezi River, with Mozambique for its capital, and that of Lourenço Marques, southward of the same river, the capital being the town of that name. In addition each of these Provinces has three intendencies.

It is administered by a royal commission, appointed for three years and residing in the capitals of the Provinces alternately.

Physical features.—There is a marked difference between the coastline, 1,430 miles in length, southward and northward of Mozambique, as the former is low, sandy, and lined with mangroves, with few and poor harbors, while to the northward it is considerably indented and has rocky headlands, rugged cliffs, and an almost continuous fringe of islets.

A mountain chain, forming the backbone of the territory, and the steep declivity of the continental plain is not always abrupt in its descent but in the lower Zambesi district and other parts slopes gradually to the coast. The Lebombo Mountains, within Delagoa Bay, are only about 2,000 feet, but farther north mountains rise to nearly 8,000 feet, and the chief range is north of the Zambezi, where Namuli Peak, of the mountains of the same name, rises to 8,860 feet, this and other mountains of nearly similar height being covered with magnificent forests.

Near Lake Nyasa the southeast side of a range attains a height of about 6,000 feet, with an abrupt descent to the lake, and the plateau lands westward are from 2,000 to 2,500 feet high.

Rivers.—The rivers, besides the Zambesi, which is the largest, are the Limpopo, Saba, Buzi, and Pungue to the southward of it and to the northward the Likugu, Lurio, Montepes, or Mtepwesi, the Msala, and the Rovuma, some of which are navigable for light-draft steam vessels for a considerable distance.

The Limpopo, rising in the Cats Rand Mountains, flows through a gold-bearing country past Johannesburg and Pretoria for a distance of about 1,500 miles, being joined by the Lipalule at about 120 miles from its mouth; it is said to be navigable for about 60 miles for light-draft steam vessels.

The Zambezi, rising in mid-Africa in about latitude 15° south, has a course of about 1,400 miles and is joined by the Shire at about 110 miles from its mouth. It runs into the sea through a delta of several mouths and having an extent of 37 miles. At about 950 miles from the sea are the Victoria or Mosivatunya Falls, the most magnificent in the world, being about 1 mile in width. The Zambesi is navigable for light-draft and stern-wheel vessels for a considerable distance, and the Shire is also navigable but is exceedingly shallow in the dry season.

Geology.—On the coast between Delagoa Bay and Mozambique there is an outcrop of cretaceous rocks from beneath superficial deposits, and sandstones and shales occur in a narrow belt at the edge of the foot plateau; but the central plateau consists of gneiss, granite, and schists, the next oldest rocks being of the Karroo period, containing workable seams of coal in one part; the Cenomanian, highest Cretaceous and Eocene formations, are represented, and some basalts.

Flora and fauna.—A varied and abundant flora includes ironwood, ebony, mangroves, sandal wood, gum copal, bombax, baobab, dracaenas, candalabra euphorbia, and several species of creepers, flowering shrubs, vitex, and ficus, while six varieties of palms are found. Coffee, cotton, indigo, tobacco, and castor oil are amongst the plants, and bananas, mangoes and pineapples amongst the fruits, while of flowers, crinum lilies, lotus, gentian, gladiola, lobelia, and violets may be mentioned. Bamboos and the spear grass (*Phragmites communis*), growing from 12 to 14 feet high, are both common.

The carnivora includes yellow and black-maned lions, the leopard, spotted hyena, jackal, serval, civit, genet, hunting dog, mongoose, and spotted otter, and other mammals are the elephant, rhinoceros, hippopotamus, wart and red hog, buffalo, antelopes, waterbuck, hartebeeste, reed and bush buck, impala, etc.; the giraffe is not found, and the kudu is rare. Hares, rabbits, and several species of monkeys are abundant.

Of reptiles, crocodiles, lizards, chameleons, pythons, cobras, puff-adders, and vipers are very numerous, and mosquitoes, locusts, the tsetse and other flies are common plagues.

Raptorial birds include the eagle, vulture, kite, buzzard, and crow, and game birds are the guinea fowl, partridge, bustard, quail, geese, teal, widgeon, mallard, and other ducks; parrots, hornbills, buntings, finches, doves, and various other birds are found.

Population.—The population of Portuguese East Africa is estimated at about 3,200,000; Lourenço Marques had 9,849 inhabitants in 1910, and Mozambique about 8,000.

Ports.—The principal ports, enumerated from the south, are: Lourenço Marques, Innamban, Chiluan, Beira, Chinde, mouth of the Zambezi, Kiliman, Angoche, Mozambique, and Ibo. Delagoa Bay, on account of its fine harbor and railway communication with the Transvaal, is of considerable importance.

Landing on the coast of the southern part of the colony is difficult, dangerous, and in many places impracticable; but on the northern portion the coast being broken up into bays, and fronted in places by islands and reefs, protection is afforded between them and the shore.

Products.—A considerable portion of the country is suitable for the growth of sugar cane, rice, ground nuts, coffee, and tobacco, and rubber vines are grown in the Mozambique district, where are large plantations of coffee and sugar. Wheat and other cereals are grown in the Zambezi Valley, the soil being fertilized by the river inundations, and the natives raise crops of maize, cassava beans, and oleaginous crops. There are large herds of cattle, and fish are plentiful.

Extensive deposits of coal are situated near Tete and Delagoa Bay, where ironstone is plentiful; malachite and copper are found in the interior, and gold mines are worked.

Trade.—The exports consist of rubber, sugar, coal, beeswax, coconuts, copra, mangrove bark, ivory, skins, ground and monkey nuts, mealies, cattle, cotton, tobacco, gold, and other minerals; and imports are foodstuffs, cotton goods, and hardware. In 1910 the combined exports and imports were valued at $29,196,000.

Communications—Steamships.—The Union Castle Mail Steamship Co. have a weekly service of steamers to Delagoa Bay and monthly to Beira and to Mozambique.

The British India have fortnightly steamers from Bombay to Beira via Zanzibar, calling monthly at Mozambique on their passage south, and at Beira steamers of the following lines call irregularly: Messrs. Rennie & Co., Clan and Ellerman-Harrison, Natal Direct, Bucknall, Houston, Empreza Nacional de Navegaçao, the latter line also calling regularly at Mozambique and other ports of Portuguese territory.

Railways.—A railway runs from Lourenço Marques to Grootspelonken, with a branch at Komati Poort to Pretoria, to which place there is also a line from Grootspelonken, with a branch northward to the Messina mine, near the Limpopo River. A railway to the border of Swaziland is under construction and nearing completion. From Beira a railway runs northwestward to Salisbury, connecting with the British Rhodesian system and with several branches at that place.

Telegraphs.—A cable connects with Durban, to the south, and another with Beira, to the north, between which place and Kiliman is a cable, and one between Kiliman and Mozambique. Mozambique is connected with Madagascar by a French cable. Land lines run from Delagoa Bay to Pretoria and to Innamban, which latter is connected by wire with Chibatu and the subdivisions of Villa Luiza, Mahica, Labie, Maqude, and Bella Vista.

Beira has a land wire to the main system of South Africa, and to Mazoe via Fort Salisbury, also to Fort Johnson, which latter is also connected by wire with Kiliman via Blantyre, and there is a land wire between Kiliman and Molecue via Bajone. Mozambique has land wires to Angoche, to the south, and to Kirondo, via Port Amelia and Palma, to the north.

Climate.—Nearly the whole of the coast of Portuguese East Africa between Delagoa Bay and Cape Delgado consisting of marshy land, and the large rivers bringing down immense quantities of decayed vegetable matter, particularly in Delagoa Bay and the delta of the Zambezi, the exhalations produced by the powerful sun, the heavy rains which succeed the great heat, and the nightly dews all tend toward the general insalubrity of this coast, and malaria is endemic, but the upper plateaus are cool and healthy.

Innamban is considered to be the least unhealthy of the Portuguese stations, the temperature being as low as 62° F. in July, but from November to May fevers are very common, and the best safeguard against them is temperate living and nonexposure to the hot sun.

About Delagoa Bay the rainy season is from September to March or April, very little rain falling in winter, and the Gaza country, between High Transvaal and Matabele Kafir land, is a rainless region.

Between the Limpopo and Zambezi Rivers the wet season is from November to April, but the valley of the Zambezi is reached by lesser rains late in October, when the sun is passing southward, these diminishing in December, and being heaviest from January to the end of March or middle of April, when the sun is going northward; the river then begins to fall and the district is most unhealthy. At Ibo the worst season is said to be between January and March, during the heavy rains.

On the coast the coolest season generally is from April to August; the rainy season from December to March; the dry season from May to the end of September; and light rains fall in November. From November to March is the rainy season at Mozambique, but a considerable fall has been experienced in May, a total fall for a year being recorded as 38.9 inches. Between Mozambique and Lake Nyasa the rainy season is from November to May.

Money.—The money is the same as in Portugal, the unit being the rei—

Rei=$\frac{8}{75}$ cent.

100 centavos=1 escudo=about 97 cents.

The silver coins are 1,000, 500, 200, 100, and 50 reis, and 50 and 20 centavos, while the copper coins are 20, 10, and 5 reis.

Notes are issued for £1, £5, and £10.

£1=5,250 reis, is the average rate of exchange.

There is a difference in the value of the milreis in Mozambique and in Kiliman, its value being considerably greater in the latter place.

Weights and measures.—The weights and measures are those of Portugal. The following native weights are in use at Mozambique:

1 bahar=20 frasils=240 pounds.

German East Africa.—Between the parallel of 10° 40′ south, near Cale Delgado and the mouth of the Umba River, in latitude 4° 41′ south, is the coast of German East Africa, having a total length of 415 miles, not including sinuosities. In its southern portion it extends westward to the east shore of Lake Nyasa, and farther to the northward to the similar shore of Lake Tanganyika, while its northern boundary is British East Africa, and it includes the southern half of Victoria Nyanza Lake. Mafia Island, about midway off the whole extent of coast, is also German territory, the whole having an area of 384,318 square miles.

The German East Africa Co. founded several stations in 1885, but these were destroyed by a native outbreak in 1889, and it was not until the next year, on the restoration of peace, that commercial enterprise recommenced. The State is administered by an imperial governor.

Physical features.—The coast is generally low and composed of coral, partly covered with sand or with rich alluvial soil with dense bush or mangroves, and is little indented; it is from 10 to 30 miles in width, extending inland to the precipitous eastern side of the interior plateau, which attains its greatest height to the northward of Lake Nyasa, where its general elevation is from 3,000 to 4,000 feet, with one peak reaching 9,600 and several 7,000 feet, from which it slopes to the northwestward.

The middle of the plateau is traversed by a deep, narrow gorge, known as the eastern Riff Valley, and several valleys are situated in the northern part, from one of which rises Kilimanjaro, an extinct volcano, 19,230 feet high, and the highest mountain in Africa; Mount Meru, a volcanic peak with a double crater, is 14,955 feet high, and situated 40 miles westward of Kilimanjaro, and southeastward of the latter are the Pare Mountains and Usambara highlands, with Nuguru and other mountainous regions, farther south on the eastern edge of the plateau.

Rivers.—The Rovuma and Rufiji, rising in the central plateau, are the largest rivers, and the Pangani, rising at Kilimanjaro, has a southeast course of about 250 miles before entering the sea; the Wami and the Kingani are other rivers, and there are four inland river systems. All the rivers are shallow and scarcely navigable for anything larger than a steam launch.

Lake Tanganyika, the eastern shore of which is in German territory, is about 350 miles in length, north and south, with a greatest width of about 45 miles, the greatest depth being 698 fathoms.

Geology.—The narrow foot plateau is mostly covered by rocks of the Tertiary ages, while Cretaceous marls and limestones, underlain by Jurassic rocks, appear at intervals to the edge of the upper plateau, and the central plateau consists almost entirely of metamorphic rocks, with some extensive tracts of granite; in the vicinity of Lakes Nyasa and Tanganyika are sandstone and shales of the Lower Karroo age, with seams of coal. Fossil remains of enormous saurians have been found.

Flora and fauna.—Mangroves and a rich tropical bush are the characteristics of the coast; the central plateau is partly grassland and partly steppe, covered with mimosa bush, while the banks of rivers are lined with belts of dense forest, in which the *Hypœne* palm is frequent, with other gum-producing mimosas and some useful timber trees.

On the slopes of the plateau the silk-cotton trees, the miomba, tamarisk, and copal tree grow, besides sycamores, banyan trees, and the deleb palm, while the *Landolphia florida*, which yields the best rubber, is found.

The fauna includes elephants, the rhinoceros, the hippopotamus, the giraffe, the lion and other carnivora, buffaloes, elands, water, bush, and reed bucks, zebras, wart hogs, roan antelopes, the greater and lesser kudu, the beisa and fringed-eared oryx, the impalah, the wilde and the hart beest, the topi, and five different species of gazelle are found; while geese, both spur-winged and Egyptian, snipe, and ducks are numerous on marshes and lakes, the latter including pintails, pochards, wood ducks, mallard, teal, and several others.

Population.—The population was about 7,680,122 in 1912, the white inhabitants numbering 5,536, of which 90 were British and 321 British colonial subjects. Dar es Salaam is the capital.

Products.—Agriculture and the products of the forests constitute the chief wealth of the territory, the latter including rubber, copal, bark, fiber, teak, mahogany, etc., and the cultivation consists of coffee, coconut palms, tobacco, sugar cane, cotton, vanilla, sorghum, ground nuts, sesame, maize, rice, beans, peas, bananas, yams, manioc, and hemp, while animal products are ivory, hides, tortoise shell, and pearls. Cattle, goats, and sheep are reared in large numbers on the plateau.

Gold, coal, iron, graphite, copper, and salt are found, the chief gold and iron deposits being near Victoria Nyanza, and of precious stones are the topaz, moonstone, and the agate, while garnets are plentiful.

Trade.—The chief products are gum copal, coconuts, copra, sesame, caoutchouc, and ivory, and fish are plentiful on the coast in the vicinity of Kilwa, Dar es Salaam, and Mafia Island, pearl oysters being found in the latter, and in several parts shell fish are abundant. In 1912 the exports amounted to $7,650,206, and the imports of cotton goods, colonial wares, rice, oil, spirits, wine, and beer to $1,223,026, the amount of fish sent to the Persian Gulf being $19,454, but this will probably be increased by improved means of capture.

In 1912 the ports were entered by 1,034 vessels, with an aggregate tonnage of 81,951 tons.

Ports.—Besides Dar es Salaam the ports, enumerated from the southward, are Mikindani, Lindi, Kilwa Kisiwani, Kilwa Kivinje, Bagamoyo, Panzani, and Tanga.

Communications—Steamships.—Steam vessels of various lines call irregularly.

Railways.—The Central Railway from Dar es Salaam runs to Kigona, on Lake Tanganyika, and the Usambara Railway from Tanga reaches New Moschi, at the foot of Mount Kilimandjaro, trains to that place running twice weekly, and daily trains between Tanga and Buiko, on the same line, run a distance of 110 miles.

Telegraph.—A cable connects Bagamoyo with Zanzibar, and from Dar es Salaam there is a land wire south of Mikindani, via Kilwa; northwest to Muansa, on Victoria Nyanza, and north to Tanga, via Bagamoyo.

Radio station.—A radio telegraph station, open to the public between certain hours, is situated at Dar es Salaam.

Climate.—Northward of Cape Delgado the climate, with some exceptions, has a bad reputation, as a severe and sometimes fatal type of fever is common, although perhaps not so much so as supposed; but, until acclimatized, it would be as well for Europeans to avoid being on shore during the night, especially in the vicinity of rivers, the worst season for whites being between February and May.

Malarial fever was on the increase in 1912, and there were cases of blackwater fever and sleeping sickness, while in the Kilimandjaro district an outbreak of plague, due to rats, was experienced.

Money.—The unit is the heller, of which there are 100 to the rupee, the latter having a value of about 32½ cents, and the silver money in the rupee, half, and quarter rupee. There is no gold in circulation, but the Deutsche Ost-Afrika Bank issues notes to the value of 5, 10, 50, and 100 rupees.

Weights and measures.—The following weights and measures are used in addition to those of the metric system:

CAPACITY.

Kibada =0.704 quarts.
Pischi=2.8175 quarts.

LENGTH.

1 schibiri=9.4699 inches.
1 mikoro=2 schibiri=18.9398 inches.
1 pima=4 mikoro=5.9024 feet.
1 doti=2 pima=11.8048 feet .

WEIGHTS.

1 wakia=1 ounce, nearly.
1 ratel=16 wakia=1 pound, nearly.
1 man=3 ratel=2.998 pounds.
1 frasila=35 ratel=34.987 pounds.

British East and Central Africa.—Between the mouths of the Umba River and Mto Ya Vumbu, extending westward on the south side as far as Belgian Kongo, and including the northern half of Victoria Nyanza, also northwestward to and including Uganda, with the small Witu protectorate, is all British territory, with a coast line of about 360 miles and a total area of 441,000 square miles, including Nyasaland and Zanzibar. A small portion of the Kongo State, northwestward of Lake Albert Nyanza, has recently become British territory.

In 1888 the Imperial British East Africa Co. received a royal charter, having also a few years previously been granted the rights of the Sultan of Zanzibar over his mainland possessions, and in 1890 the respective spheres of Great Britain and Germany having been settled by mutual agreement, Zanzibar and Witu became British protectorates. The Imperial Government, through the colonial office, took over the administration of the East Africa, Uganda, and Somaliland protectorates in 1905, British Central Africa, now named Nyasaland, having been similarly transferred the previous year.

For administrative purposes the protectorate is divided into eight Provinces, which are again subdivided into districts and subdistricts; the Provinces are Seyidie, Ukamba, Tanaland, Jubaland, Kenya, Naivasha, Nyanza, and the Northern Frontier District, the centers of administration being, respectively, Mombasa, Nairobi, Lamu, Kisimayu, Nyeri, Naivasha, Kisumu, and Marsabit. Of the Provinces, Ukamba and Naivasha are the most suitable for European colonization.

Witu, the small tract of country at the mouth of the Tana River, is for administrative purposes included in Tanaland.

The administration is carried out under the colonial office, by a governor, assisted by legislative and executive councils.

Physical features.—Beyond the coast plain the land rises in well-defined steppes to about 800 feet, forming a wide, level plain, containing large waterless areas, and from this the ascent is marked by an intermittent line of mountains, stretching north-northwestward, sometimes in parallel chains, and varying from 5,000 to 8,000 feet.

Farther inland are grassy uplands, varied with cultivated ground and forest, the largest plains being those of Kapte, Kapote, and Athi, and the elevations about the same as those previously given, but this zone contains the highest elevations in the protectorate, the Kenya, Sattima, and Nandarau Ranges reaching, respectively, 17,007, 13,214, and about 12,900 feet.

Besides Lake Rudolf, in the northwest part of the territory, which has an area of about 3,500 square miles, there are several smaller lakes, some at considerable elevations, as Lake Naivasha, Nakuro, and

Elmenteita are 6,135, 5,845, and 5,860 feet, respectively, above sea level.

Lake Victoria Nyanza, the northern half of which is in British and the southern half in German territory, is 3,726 feet above sea level, and about 180 miles in length in an east and west and 150 miles in breadth in a north and south direction; it has an area of about 27,000 square miles. In Ugowe Bay, on the northeast side, is Port Florence, the terminus of the Uganda Railway, besides which are several other towns on its shores, the principal being Mwanza, on the south, which is the terminus of the route from Bagamoyo, Bukoba, on the west, and Schirati, on the east, shores, and a service of small steamers calls at all the chief towns.

Geology.—The formations are Archean, consisting of gneisses, granites, schists, and quartzites; Carboniferous, of shales; Karroo, of flags, sandstones, and grits of shales; Jurassic, of shales and limestones; Pleistocene, of gravels with flint instruments and glacial beds; and recent, of alluvia and superficial sands, lake deposits, and living and raised coral rock. A belt of volcanic rocks extends from and beyond the southern to beyond the northern boundary of the territory.

Flora and fauna.—The characteristic trees of the coast regions are the mangrove and the coconut palm, ebony growing in the scrub jungle. Olives and junipers form vast forests on the declivities in the locality of Mau, and in a similar position in the Kikuyu district the cotton, the fig, and the bamboo are found, while in several regions are dense forests of large trees, whose lowest branches are at least 50 feet from the ground.

Near the coast and in the forests are two varieties of rubber vines, *Landolphia florida* and *L. Kirkii.*

The fauna, which is not abundant, except in large mammals, includes those already given for German East Africa, and crocodiles are common in Victoria Nyanza and in the large rivers, but snakes are somewhat rare, the puff adder being the most dangerous; centipedes, scorpions, and mosquitoes are less common than usual in tropical countries.

The birds include the ostrich, the stork, the greater bustard and secretary bird, the guinea fowl, the lesser bustard, wild pigeon, weaver bird, and hornbill, and various spur fowl, while near lakes and rivers cranes, pelicans, and flamingoes are abundant.

Population.—The estimated populations are: East Africa Protectorate 4,000,000, and Uganda 2,500,000; Nairobi, the capital of the protectorate, has about 25,000 inhabitants, of which number 1,200 are Europeans.

There are two branches of Somali in East Africa, the Darud and the Isaak, the former being about the Mto Ya Vumbu. The Somali musselmen are lazy and religious, but if treated with confidence and consideration, they are cheerful, intelligent, willing to learn, and are true to their code of honesty, but if treated harshly or unjustly they become sulky, obstinate, mutinous, and dangerous; they are good scouts, excellent marchers, and are proud of any confidence placed in them.

Products.—The products are tropical, and rice, maize, and other grains are grown in large quantities, there being numerous plantations owned by Europeans; cotton and tobacco are also cultivated. Plantations of coconut palms yield excellent copra, and in some parts of the interior beans of castor oil are a lucrative article of commerce. Sugar cane, growing freely in various parts, is chiefly cultivated by the natives.

In the upland regions, oats, barley, wheat, coffee, and vegetables, including large crops of potatoes, are grown, and clover, lucerne, rye grass, and other grasses have been introduced as fodder, as this part is adapted for raising stock, and large flocks and herds are possessed by settlers.

Fiber industry, cotton-ginning, and bacon-curing are amongst the manufactories, and the natives make mats, baskets, and weave cloth.

Trade.—The principal exports from the East African Protectorate, consisting of ivory, grain, rubber, fiber, and copra, were valued at $7,221,506 in 1913–14, and the imports at $10,460,453.19; the aggregate tonnage of steam vessels entering the ports was 1,734,564 tons.

Ports.—Mombasa has perhaps the finest harbor on the east African coast, it and Kilindini being the principal ports, while others are Kilifi, Lamu, and Kisimayu.

Landing may generally be effected from most of the anchorages, but on those parts of the coast exposed to the ocean it is sometimes difficult, and northward of Pemba, with on-shore winds, it may be dangerous; where the coast is fronted by islands and detached reefs it can be generally effected in the smooth water.

Communications—Steamships.—The British India Co.'s vessels, between Bombay and Zanzibar, call monthly at Mombasa each way, and there is also a service to some ports by the Union Castle Mail Steamship Co.'s vessels.

Railways.—Mombasa, the terminus of the Uganda Railway, is connected with the mainland by a bridge 1,732 feet in length, the total length of the railway to Port Florence, on Lake Victoria Nyanza, being 584 miles.

A railway between Port Herald and Blantyre, 113 miles from Port Herald, with a branch to the north bank of the Zambezi, will probably be extended to Lake Nyasa, via Zomba.

Telegraph.—Mombasa is connected by cable with Zanzibar, and thus by cables with Aden, Bagamoyo, Mozambique, and Seychelles. Land lines run to Lamu on the coast, and northwestward to Port Florence via Tsavo and Nairobi, while Port Florence is connected by wire with Entebbe, on the north shore of Lake Victoria Nyanza, and with Nimule, on the Nile.

Climate.—For descriptive climatic conditions the protectorate may be divided into three zones, consisting of the coast belt, the highlands, and the Victoria Nyanza district, and of these the coast belt, comprising a strip about 100 miles broad, extending from the Anglo-German frontier to the Mto Ya Vumbu, is essentially tropical, the atmosphere being always charged with a considerable amount of moisture, rendering it more trying to Europeans than it would otherwise be, considering that the temperature is equable and never very high.

Malaria and other tropical diseases are infrequent, and the climate is not, as a rule, unhealthy for Europeans, but after a long residence it is likely to be enervating; on the coast, particularly during the southwest monsoon, cool breezes blow constantly, but about 10 or 15 miles inland, where the scrub country commerces, the heat, untempered by these breezes, becomes less bearable, and malaria is more common. These remarks also apply to the Tana River Valley, which, in addition, at certain seasons, is rendered almost intolerable by the presence of swarms of mosquitoes.

From January to March, inclusive, is the hottest season, although the nights are generally fairly cool, except in the lull between the monsoons, when they are often oppressive; most rain falls during April, May, June, and November, but the rainfall varies greatly in different parts of the protectorate, and the rainy seasons are somewhat variable. At Mombasa, Malindi, and Kisimayu the average annual rainfall is 52½, 38, and 14¾ inches, respectively.

The highlands, or inland district, where, after a gradual rise from the coast, until an altitude of 9,000 feet or 18,000 feet on snow-clad Mount Kenia is reached, the climate is generally exceedingly healthy.

At Machakos and Nairobi, in this district, the rainfall is 36¼ and 38¾ inches, respectively.

Victoria Nyanza district, lying in a depression, to which the land makes a somewhat rapid descent from the highlands, is 3,726 feet above sea level, but the climate is again tropical, the heat approaching, and even exceeding, that on the coast, so that the climate is probably less agreeable than that of other parts of the protectorate; malaria is common, and if not carefully treated may lead to attacks of black-water fever.

Violent thunderstorms are frequent, and at Mumias and Port Florence in this district the rainfall is 73½ and 50 inches, respectively.

Money—Weights and measures.—The money, weights, and measures are the same as those of Great Britain.

Zanzibar.—The island of Zanzibar, lying off the coast northeastward of Bagamoyo, is about 47 miles in length north and south, and about 20 miles in greatest breadth, and has an area of 640 square miles; it, with Pemba, was first taken possession of in 1505, by the Portuguese, who rounded the Cape of Good Hope, but owing to their tyrannical treatment of the natives these were taken from them by the Imams of Muscat in 1698; Zanzibar was first visited by British war vessels in 1799, and it has been a British Protectorate since 1890. A resident is stationed at Zanzibar. This island, Pemba, the coast between Wanga and Kipini, and the Lamu, Manda, Patta, and Siwa Islands, are under the administration of the governor of the East Africa Protectorate.

Physical features.—Standing on a coral flat, the island, 440 feet high, and undulating, has ridges stretching north and south, with plains between them, which in several instances, show a coralline surface worn into points and ridges; portions of it are extremely fertile, and although the soil is sandy in places, even there tropical cereals and edible roots grow in profusion.

Population.—In 1911 the population of Zanzibar and Pemba combined amounted to 198,914.

Products.—Beyond cloves there are no considerable products, but the island, owing to its geographical position, may be considered as a large storehouse for the whole east African coast, and the port of Zanzibar is a large transshipment and distributing center.

Trade.—The export of cloves averages about $1,461,000 per annum, and the other exports are ivory, copra, hides, gum copal, etc., the whole being valued at $5,107,977 in 1913, while the imports, consisting of piece goods, ivory, copra, groceries, rice, and coal, were valued at $5,373,299 in the same year, during which period the port of Zanzibar was entered by 310 steam, and 196 coasting vessels, with aggregate tonnages, respectively, of 1,355,628, and 84,426 tons, besides 4,642 dhows of 62,866 tons.

Ports.—Zanzibar harbor is the chief and only port used by vessels engaged in ocean traffic, but there are several good anchorages.

Communications.—The Union Castle Mail Steamship Co., and the Clan, Ellerman, and Harrison, and the British India Steam Navigation Co. furnish a direct service of steam vessels between Zanzibar and the United Kingdom. The Messageries Maritimes have through steamers to Europe. The British India Steam Navigation Co. maintain a fortnightly service to India and South Africa. The Societa Nazionale de Servize Maritime occasionally call at Zanzibar.

Telegraph.—Submarine cables connect to the southward with Mozambique; to the eastward with Seychelles Islands; to the westward with Bagamoyo; and to the northward with Aden; there is also a wireless station open to the public. The town of Zanzibar has a telephone installation.

About 75 miles of roads are suitable for motor traffic.

Climate.—The bad reputation which the climate has obtained is probably due to the severe and sometimes fatal type of fever, the virulence and effects of which are perhaps somewhat exaggerated, but Europeans should avoid spending the night on shore except in the town, until acclimatized, and especially when in the vicinity of rivers, the worst season for whites being from February to May, although the natives appear to suffer more in July and August.

During the coolest months, from July to September, inclusive, the day temperature on board vessels ranges from 77° to 81°, falling occasionally to 73° F. by night; in the hottest months, from January to March, inclusive, the day range is from 83° to 90°, rarely falling below 80° by night.

Money.—The British Indian rupee of about 32½ cents value, the standard coin of the protectorate, is a legal tender at a fixed rate of 15 rupees to the pound up to any amount. British sovereigns are also a legal tender to any amount at 15 rupees, but are only obtainable in small quantities. Seyyidieh copper pice, which are a legal tender at the rate of 64 pice to 1 rupee for the payment of an amount not exceeding 5 rupees, are useful for the purchase of small local supplies. There is also a Government note issue.

Pemba, lying 22 miles northeastward of Zanzibar, is 38 miles in length, about 13 miles in width, and rises to about 300 feet high, its surface being broken into ridges and valleys, covered with luxuriant vegetation. The early history of Pemba is similar to that of Zanzibar, but it was not visited by British war vessels until 1822, and on the African dominions of Muscat becoming independent in 1860, it came under the rule of the Sultan of Zanzibar; slavery in this island and Zanzibar was not entirely abolished until 1897, although Pemba became a British Protectorate in 1890.

Flora and fauna.—Coconut and borassus palms, baobab trees, orange and mango trees, and several others that yield rubber, are the principal trees, while bamboos, mimosa scrub, and lemon grass grow in places, and mangroves on the whole of the west coast; orchids and ferns are found.

There is no large carnivora, the wild pig being the largest and most numerous mammal; small grey monkeys and lemurs are common, and there are a few wildcats. The birds are also few—chiefly black and white crows, curlews, egrets, a small species of kingfisher, and some parrots.

Products.—Cloves are the chief product of the island, the quantity exported being about three times that sent from Zanzibar; the soil is rich, and all tropical cereals and edible roots flourish; coconuts are abundant, and there are some considerable herds of cattle.

Communication.—A weekly service between Zanzibar and Pemba is carried on by a Zanzibȧr Government steamer, and a large number of dhows trade between the two islands. There is a wireless telegraph station on the island.

Climate.—The heat is considerable, especially at the change of the monsoon, when the winds are light; April and May are the seasons of heavy rains, while the lesser rains are in November.

Malarial fever, caused by the *Anopheles* mosquito, is common, especially inland, and Europeans sleeping there by night are almost sure to be attacked by it; black-water fever, to which both Europeans and Indians are liable, does not appear to affect Africans greatly, and of Europeans suffering from it usually about 40 per cent recover. A tick fever, caused by a microbe carried by a small tick, is accompanied by biliousness and jaundice, and quinine is no use as a remedy for it.

Italian East Africa.—From the Mto Ya Vumbu to and beyond Ras Asir, is the coastline of Italian East Africa, known as the Benadir coast, on account of its containing four ports; bander signifying a port, and benadir being the plural. The Somali coast was conquered by the Portuguese in the sixteenth century, by the Imams of Muscat in the seventeenth century, and by the Sultan of Zanzibar in the nineteenth century, who leased the Benadir ports to Italy for 50 years in 1892, and they have been administered by the Benadir Co. since 1898. The remainder of this Italian territory, which is not described in this work, reaches to longitude 49° east, where British territory again commences.

The Benadir country, which is little known, is generally flat with thorn and other bushes, and for a distance of 115 miles from the southern boundary, has reddish sand dunes, sparsely covered with bushes and mimosa thorn, and backed by high sand hills; farther north it becomes bare, and with the exception of some high land between Ras Asswad and Ras Awath, and a break, caused by the Wadi Nogal, just to the northward of Ras al Khyle, the coast is low, rocky, and sterile, but inland there are areas of pasture land; the whole of Italian Somaliland has an area of about 131,000 square miles.

Geology.—The formations in this territory consist almost entirely of gneiss, granite, and schists.

Rivers.—The Haines, Doho, or Webbe Shebeli River, the only permanent stream except the Mto Ya Vumbu, and discharging into a marshy lake apparently connected with that river, has tributaries, some of which rise in the highlands of Gurage, the river flowing with sometimes a rapid current, through a famous pastoral region, supporting Somali herds of camels, ponies, cows, and sheep, and having numerous agricultural settlements along its banks.

The Mto Ya Vumbu, ascended to rapids distant by the sinuosities of the river about 407 miles from its mouth, but only about 130 miles in a direct line from the sea, is supposed to have its source a considerable distance inland, and in its vicinity are also park-like plains, on which numbers of cattle, camels, and goats are pastured.

Population.—The population of Italian Somaliland is estimated at about 300,000, the inhabitants of the coast towns being the Amaran Tribe, a mixture of Arab and Somali blood, and Swahili, Arabs, and Indians.

Products.—A large amount of land is barren, but the soil is fairly good in the Doho River and Webi Nogal Valleys, while the most fertile district is the valley of the lower Mto Ya Vumbu, where is a narrow strip of land not exceeding about 4 miles in width, and only about 100 yards at its narrowest part, which extends for a distance of over 100 miles, and being annually inundated by the rise of the river, grows rich crops of millet and other grains; in other parts various species of resinous plants are found.

The articles generally exported from this coast are ivory, hides, orchilla weed, gums, sesame, earthen pots, and homespun cloth, and cattle, sheep, and goats are raised in considerable numbers; camels might be obtained, for transport service if required.

Ports.—The ports are only open anchorages, Brawa, Merka, Mogadiscio, and Athelet being the principal.

Communication—Wireless telegraph.—There are wireless telegraph stations on this coast at Brawa, Merka, Mogadiscio, and Athelet, and inland at Gimbo and Bardera, on the Mto Ya Vumbu, Lugh, and Mahaddei.

Uniform time.—The standard time kept in the Italian colonies of Benadir and Somali is that of longitude 45° east, or 3 hours fast of Greenwich mean time.

Climate.—The climate of the Mto Ya Vumbu is generally healthy for Europeans, for the heat is dry, although often intense; the average coastal temperature is 80° F., but it is considerably greater inland. Gu, the heavy rains, are from March to July; hagar, the dry season, from July to August; dair, the lesser rains, is from September to November; and derar, the dry season, from December to February, the rainfall being less on the coast than inland.

On the Italian coast the rainy season is from the end of March to the end of June, and to July in the interior, the remaining months are dry.

The climate at Brawa and the neighborhood is said to be healthy.

Money.—One erythraischer taler=about 94 cents; 1 maria theresientaler=about 45 cents.

Weights.—One occa=2 rotoli=40 oncia=2¾ pounds.

Measures are metric system.

Winds and weather—South Africa.—The area under consideration lies between latitudes 30° and 50° south, and the meridians of 10° and 40° east, and near the coast of South Africa, easterly and westerly winds alternate, the former prevailing in summer and the latter in winter. Southerly winds, between southwest and southeast, prevail throughout the year in the northwestern part of the district, northwestward of the Cape of Good Hope, but they extend farther southward in summer than in winter.

Northerly and northeasterly winds prevail on the eastern side of the area, off and southward of Natal, but at Natal northeasterly and southwesternly winds appear to be equally divided. Local winds are mentioned with the descriptions of the different ports.

Summer.—From October to April, the summer months, the prevailing winds are southeasterly, this being the worst time for anchoring off the ports of South Africa, as these winds occasionally rise to the strength of gales, last for three or more days, and are followed by calms and light westerly winds. The wind follows the trend of the coast, being nearly from east between Natal and Algoa Bay; southeast from Algoa Bay to Cape Agulhas, and south-southeast into False Bay.

In strength the southeasterly winds are sometimes singularly local, as they may be light at Cape Hangklip and Point Danger from the southeastward, when it is blowing a heavy gale from the same quarter in Simons and Table Bays. Westerly winds and heavy westerly gales are, however, not uncommon at this season; the best chance of avoiding them is to keep well in with the land, and there is less sea over the Agulhas Bank than southward of it.

Winter.—From April to October westerly winds prevail, and gales are especially severe and frequent southeastward of the Agulhas Bank in June and July. In May, August, and September, between the coast and latitude 37° south, easterly and westerly winds are about equally divided; easterly winds occasionally occur in the other winter months.

The Roaring Forties.—The westerly winds on the fortieth parallel, or farther south, assume such force that they are known to seamen as the "Roaring Forties," but the supposition that between latitudes 40° and 50° south the wind is constant from the westward has been disproved, and it is now known that the winds in that area are cyclonic in character, and that the central depression is generally southward of latitude 45° south, and the system of large area with a progressive movement eastward.

The wind in the northern semicircle commencing between north and northwest may therefore be expected to veer westward, freshening as it does so, and frequently shifting more or less suddenly to southwest, from which quarter will probably be the strongest blow, with a rising barometer.

A sailing vessel steering eastward will, therefore, hold a fair wind for a longer or shorter time in proportion to the comparison of the vessel's speed with the progressive motion of the cyclonic system. When the progressive movement of the latter is not much greater than the vessel's speed westerly winds may be carried for days; also, after losing their benefit and experiencing a day or two of light and variable winds, the vessel may probably be overtaken by another system, and so repeat the process.

In accordance with the well-known cyclonic law as to the wind being strongest and changes more rapid as the centers of depressions are approached, it follows that a vessel in about latitude 40° south may expect more steady westerly winds with less sea than if farther south. Hence this parallel is recommended as the best for making easting, whether rounding the Cape of Good Hope or bound from it either to Mauritius, India, China, or Australia.

From the shortening of distance effected by following an approximation to the great circle track to Australia, vessels sometimes make quicker passages, but it is frequently at the expense of much straining of the vessel and anxiety to the navigator.

Should the area of lowest depression of any system be farther northward than usual, and thus northward of a vessel's track, which is occasionally, but not often, the case if the fortieth parallel be followed, the wind will shift to the eastward instead of to the westward, and a hard easterly or southeastrly gale will probably follow, this being much more likely to occur in the high latitudes of a great circle route than in following the course recommended.

Gales.—The severity of gales off the Cape of Good Hope, the rapidity with which they succeed each other, and their violence during the winter months, are all generally known to navigators; their approach, fortunately, can usually be accurately predicted. A falling barometer, with a southerly wind and threatening weather, is a most useful warning, and experience has shown that a fall of the barometer to 29.5 in summer, or to 29.75 in winter, is an almost certain indication of approaching bad weather.

The greater number of gales are experienced between the southeastern edge of the Agulhas Bank and about latitude 40° south, where the Agulhas current being deflected to the southward by the bank, meets the northeast drift from the Antarctic, as here the conflict takes place between the warm and cold currents of the air and those of the sea. In the months of June and July about 30 per cent of the winds on this edge of the Agulhas Bank are recorded as gales, but it often happens that the most prolonged of these storms are either quite moderate, or are not felt near the shore.

Gales in this locality are frequently of small area, so that the shifts of winds are sudden, violent, and may come from any direction; this, and the usually heavy sea, particularly during the southwest gales, render this neighborhood one to be avoided by seamen.

The proportion of gales in the usual outward and homeward tracks of vessels, is as follows:

Direction.	Outward route latitude 40° south and to the southward of it.	Homeward route, near the coast.
	Per cent.	*Per cent.*
Northwest	42	27
Southwest	29	36
Northeast	5	8
Southeast	7	13
Exceptional	17	16

The probability of experiencing gales about the following months of the year is as follows:

Month.	Outward route latitude 40° south and to the southward of it.	Homeward route, near the coast.
	Per cent.	*Per cent.*
January	8	6
April	10	6
July	14	13
October	9	10

Westerly gales, amounting to about two-thirds of the whole number experienced, consist of northwest and southwest gales, the former generally commencing with the falling barometer, sometimes do not attain their full force until the wind is about west. Southwest gales begin from the same quarter as those from the northwest, the first fall of the barometer coming with a northerly wind shifting to northwest, the chief difference being that with southwest gale systems the northwest wind does not attain the force of a gale.

Violent westerly gales of winter, raising a heavy sea, frequently extend on the coast from Table Bay to Cape Corrientes, but northwest gales of summer seldom last long between these points; during both summer and winter, the approach of northwest gales is indicated by a low barometer, a clear atmosphere, and generally a bank of clouds to the westward, the wind commencing to blow after a slight increase of atmospheric pressure, the barometer continuing to its greatest force at west-southwest, with the barometer about 30° and a low temperature.

Some of the hardest westerly gales succeed moderate east winds, when the barometer, at about 30°, has ceased to rise with the wind at west. During October and November fierce gales from northwest, lasting for days, are occasionally experienced between Cape St. Francis and Cape Agulhas, the barometer reaching 29.60°, and the temperature about 60° F.

Easterly gales.—Northeast gales, forming about 6 per cent of the whole experienced in the cape region, are usually met with in the eastern portion of the area contained between longitude 30° to 40° east, and are generally short, not severe, and frequently losing the force of a gale before the lowest reading of the barometer is reached; lightning sometimes accompanies them.

In connection with these gales it is important to remember that they are generally followed by winds from northwest, southwest, to south, or even from southeast, and that these winds may in many cases attain the force of a heavy gale, the second gale sometimes setting in with a sudden change of wind; it is therefore necessary during a northeast gale, especially when near the southeast coast of Africa, that the barometer, the weather, and the sea should be carefully watched, as through the neglect of this many sailing vessels, particularly in the neighborhood of Algoa Bay, have been taken aback, and so foundered.

Southeast gales, forming about 10 per cent of those experienced off the Cape of Good Hope and south coast of Africa, are of two classes, namely, those preceded by north or northwest winds and those preceded by south or southeast winds.

Those following north winds resemble southwest gales in their character, commencing after the lowest barometer reading; with these lightning often occurs before the change of wind from the northward and westward to southeast.

Gales preceded by southerly winds may be again subdivided:

(1) Fine-weather gales, generally met with near the Cape of Good Hope, more especially during the summer months; these are accompanied by a slight fall of the barometer, and are closely related to the southeast gales common to Table Bay.

(2) Gales related to the southwestern side of a cyclonic wind system, moving southward or southeastward, are generally accompanied by bad weather and are sometimes very severe; as they progress the wind often backs to the westward of south, the change generally taking place after the lowest fall of the barometer. If necessary to

heave to in such a gale the starboard tack should be preferred, as it is the coming-up tack.

The southeast gale of Table Bay, which is an extension of the southeast trade, caused by a high-pressure area to the westward, differs from the southeast gale experienced eastward of Cape Agulhas, being a clear, dry wind, during the continuance of which the atmospheric pressure remains steady, or perhaps increases, whereas the latter is a damp, hot wind, blowing from higher latitudes and circulating round an area of low pressure.

There is a marked change both in wind and weather off Cape Agulhas, and although a southeast gale may prevail from Cape St. Francis to the southward and westward, in about 70 per cent of these gales the wind will shift to the northward off Cape Agulhas, and southeast gales blowing hard between the Cape of Good Hope and Cape Agulhas generally moderate off the latter cape.

Exceptional gales, forming about 16 per cent of the whole on this coast, change quickly from one quarter to another, or, from some cause, can not be classed with those previously referred to, and a dangerous type of these gales, frequently met with, more especially near the southeast coast of Africa, is one that changes rapidly from northeast to northwest or southwest.

Shifting suddenly from one quarter to another, it is impossible to maneuver to avoid these gales, so that when lightning or when other signs in the weather or the direction of the swell indicate such change, a sailing vessel should reduce sail, especially on the main and mizzen masts.

In gales shifting from northeast to northwest, in which the barometer begins to rise as the wind goes to the latter quarter, or in those which shift quickly from northeast, through north, to southwest, the port tack should be preferred if heaving to.

Natal coast.—Easterly gales occur on the Natal coast during the wet season, from October to February, and also from May to July, which are the finest months on that coast. One of these gales may commence under the following conditions: Calm weather with the barometer standing at 30.60 in the morning, the temperature being about 70° F. in the shade, and, but for a bank of cirro-stratus in the southeast and cirro-cumulus over the same quarter, a cloudless sky, only a peculiar haze hanging over the horizon.

A considerably increasing temperature with a decreasing atmospheric pressure occurs toward noon, and about that period or, perhaps, soon after low water an easterly breeze springs up and soon freshens to a moderate gale, with a falling barometer and a shift of wind to the northward of east as the afternoon advances. Some 50 or 100 miles seaward the direction of the wind will be southeast, but on arriving at the coast it takes its direction about east-northeast, increasing to a strong gale, moderating toward sunset or shortly afterwards. A long, heavy swell sets in from the southeastward.

About sunrise next day or soon after low water the breeze again freshens, with rapidly decreasing barometric pressure and increasing temperature, till about noon or when the barometer has fallen to about 30 the gale will probably have reached its height; a thin line of cirro-stratus stretches along the western horizon and continues to deepen, while cirrus appears in the northwest sky.

The gale blows steadily until about three hours before sunset or till when the mercury has fallen to 29.70 or 29.80 inches, with rapidly decreasing temperature, while a bank of clouds, rising in the northwest, throws out long streaks of cirrus across the sky; the wind becomes puffy, moderating, often suddenly, with the barometer as low as 29.60, directly the mercury ceases to fall, and the sea having the appearance of boiling water.

Although the wind may probably die away altogether after sunset and a heavy dew fall, often the change of wind comes immediately after the cessation of the previous gale, when the barometer commences to rise, and usually with the turn of the tide, and in this case particularly between October and December, both inclusive, the wind may blow suddenly from the northwest with great violence and heavy driving rain.

The wind generally increases as the pressure rises, and it may shift to southwest in a rain squall and blow itself out with a rising barometer, but the hardest gales occur when the wind changes slowly to west or west-southwest, with drizzling rain, the mercury oscillating between 30 and 30.10 inches, and these southwest gales extend, as a rule, from Cape St. Francis to Mozambique, lasting for 48 hours or even more, the weather moderating directly the mercury rises, and fine, settled weather following.

The foregoings are the prognostics of typical easterly gales on this coast, but naturally there may be many variations.

Mozambique Channel.—The winds in the Mozambique Channel depend on those of the Indian Ocean and Arabian Sea. The seasons are distinguished, as those of the northern and southern monsoons, but the winds do not blow here with the same regularity as farther north, and gradually lose the character of monsoons altogether in proceeding southward. The northern monsoon commences between mid-September and mid-October, the southern monsoon between mid-March and mid-April, and the change of season is generally accompanied by squally weather.

Southward of latitude 20° south, from abreast of central Madagascar, the northern monsoon ceases and the winds become variable, south and south-southeast winds prevailing, particularly on the Madagascar side, near the southwestern end of which island southeast and east-southeast winds are experienced all the year around, but do not extend far up its coast.

Northern monsoon.—In the Mozambique Channel the northern monsoon, from its commencement to nearly the end of December, is light and variable, with smooth water and usually fine weather; the wind, as the southern monsoon dies away, changing gradually to the left, westerly winds and calms intervening until the northern monsoon becomes established in the end of October; though it is really only during November and December that the prevalence of northeasterly winds deserves the name of monsoon, and even then westerly winds are not rare. Toward the end of December the monsoon becomes strong; for three consecutive years the first decided blow was observed to occur at Comoro Islands on December 25.

This monsoon continues blowing with some force until about the beginning of February, at which time, in the southern part of the channel, the southerly wind begins to make itself felt, and about the end of February it is fully established, though not attaining force until April. As a rule, the northern monsoon, being the season of least wind, is consequently that of smoothest water in most of the anchorages from Delagoa Bay northward; it is also the most unhealthy season.

Near the Mozambique coast, from and after December, calms, variable winds, and rains are met with, although in mid-channel it is usually fine with a fresh breeze. During the northern monsoon the southerly wind, prevailing at the southern end of the channel, often amounts to a gale, producing a heavy sea; such winds commonly force their way northward, overcoming the monsoon even as far north as the Comoro Islands, and blow with a force of about 7 of Beaufort notation. This weather does not last long and is usually preceded by heavy banks of cloud to the southward, with gloomy weather.

Southern monsoon.—The southern monsoon blows from south-southeast to south-southwest between Europa Island and the Comoro group, attaining its greatest westing in May and June; from July it gradually veers to the eastward; in September and until November calms and light winds are prevalent until the northern monsoon is again established. The southern monsoon is considered the fine weather and healthy season, and is generally free from gales, but there is much more wind and sea at this time in the Mozambique Channel than during the northern monsoon, and vessels proceeding southward frequently encounter a wind with a force of about 7, and a heavy sea.

On the coast of Madagascar, land and sea breezes prevail, the former being very light and lasting from about midnight till noon; the sea breeze generally sets in during the afternoon, increasing in force until sunset, when it subsides and gradually dies away toward midnight, followed by the land wind. In the evening, within 20 miles of the coast, lightning and thick banks of cloud, having a threatening appearance, are common, but generally harmless.

At the Comoro Islands the southern monsoon sets in about the middle of March, when heavy squalls from the westward and much rain may be expected; from thence the monsoon makes its way up the African coast.

Calms.—During the northern monsoon the frequency of calms is about 25 per cent, and in the southern monsoon 10 per cent; in November they are most prevalent, being about three times as many as in June, and the Madagascar coast is most subject to them. At all times of the year calms are most common northward of the twentieth parallel, but southward of that, and as far as the twenty-fifth parallel, they are rare during the southern monsoon, although farther southward they are most common during that monsoon.

Gales.—The Mozambique Channel is occasionally subject to hard gales and severe weather, besides an occasional cyclone may be experienced. The gales, generally occuring during the northern monsoon, mostly commence by the monsoon freshening to a force of 6 or 7; the wind then slackens, with a steady barometer, shifts rapidly, through west, and finally sets in as a violent gale from south to southwest, although occasionally the wind shifts through east.

Sometimes the steep gradients are to the eastward when the northerly wind, remaining steady in direction, will increase to a violent gale generally foretold by a threatening sky to the westward, with lightning; or these gales may occur after several days' calm.

Cyclones.—Indian Ocean cyclones, sometimes doing considerable damage in the vicinity of Mauritius between the months of December and April, are usually intercepted by the high land of Madagascar before reaching the Mozambique Channel, but occasionally one crosses the island, or more often passes northward of it, into that channel. One of these crossed the Mozambique Channel on January 28–30, 1887, in a westerly direction from northward of Capt St. Andrew, its center passing over the Castle Line steamship *Courland* in latitude 20° south, longitude 37° east, about 50 miles southward of the Zambezi.

Proceeding up the coast from Delagoa Bay, this vessel experienced strong south-southeast winds with violent squalls, a constantly increasing sea, and falling barometer, and was compelled to head the terrific sea when passing through the center of the storm. The only noticeable feature, in an almost uniformly overcast sky over which the drift scudded furiously, was a peculiarly leaden hue in the zenith, but there was no heavy solid banking up of clouds, and very little thunder and lightning, although the rain was heavy and continuous.

The barometer fell from 29.61 at noon on the 29th to 28.98 at 8 p. m. on 30th, at which time the center passed over the ship, and the stars became visible overhead. The wind in this cyclone, blowing from the northward on the coast of Madagascar, caused an extraordinarily high tide and heavy sea at Morondava.

In February, 1894, a cyclone passing over Diego Suarez Bay, on the northeast coast of Madagascar, and doing considerable damage there, then crossed the Mozambique Channel and took much the same direction southward as that experienced by the steamship *Courland*. In 1899 two cyclones followed much the same courses after crossing the northern end of Madagascar and passed southward a short distance off Mozambique.

The latest similar cyclone recorded, and one of the most violent and extensive, occurred in December, 1904. It first struck the northern part of Madagascar in its approach from the Indian Ocean, doing much damage between December 14 and 16 at Diego Suarez, and along the northwestern coast of Madagascar at least as far as Mojanga. The northern limit of its track was clearly defined by the island of Grand Comoro escaping, whilst the other islands of the Comoro group all suffered from the visitation.

In its course down the Mozambique Channel it apprently occupied the whole width of the narrowest part.

Cyclones have occurred toward the latter end of January in Mozambique Harbor, notably in the years 1841–1843, and that place was visited by a severe one on April 1 and 2, 1858, during which vessels were driven from their anchors in the harbor and much damage was done. The last recorded was in December, 1899, which temporarily destroyed lights, leading marks, etc., with other damage.

It is doubtful whether all the cyclones recorded as "stationary" were really so, as some so classed were only one day under observation, but with every allowance for error from this cause it may still be inferred that as the cyclone season approaches its height the proportion of rapidly progressing cyclonic areas increases, and that at the beginning and end of the season they may be more or less stationary.

A cyclone, the only one on record at Zanzibar, commenced at 9 p. m., on April 14, 1872, blowing strongly from south-southwest, accompanied by rain, and increased in force and veered to south till about 1.30 p. m. of the 15th, when it suddently fell calm, the barometer having fallen 0.9 inch below the normal height. At 2.15 p. m. the barometer commenced to rise, and the cyclone burst upon the town and harbor from north-northeast, the opposite quarter, veering by north to west-northwest, where it settled, but moderated considerably between 4 and 8 p. m.

The cyclone swept over the island of Zanzibar, destroying all in its path, but leaving the southern part uninjured; it was not experienced in Pemba.

East coast of Africa.—On the coast to the northward of Cape Delgado, and on the ocean to the eastward, the winds consist of the northeast and southwest monsoons.

Northeast monsoon.—The northeast monsoon, commencing in the Arabian Sea about the middle of October, sometimes does not reach the coast of Africa and Zanzibar until the middle or end of November; the changes of monsoon, which may occupy a fortnight or more, are accompanied by shifts of wind, calms, squalls of rain, and obscured sky. Occasionally the northeast monsoon is so light that many dhows from Arabia fail to reach Zanzibar, and have to put into Mombasa.

From Cape Delgado to the Equator, in February and March, although during the time of the northeast monsoon, the winds are between east-northeast, and east-southeast. During these months, therefore, it is possible for dhows to make their way thus far northward. The weather also, in this locality, is then generally fine, with occasional showers and sometimes thunder and lightning, but no heavy squalls.

Southwest monsoon.—After an interval of calms and light winds the southwest monsoon sets in, reaching Zanzibar some time in March, Ras Asir about the end of April, and Bombay about the first week in June. Southward and eastward of Sokotra it attains its full force in June, and so continues until September, blowing stronger and steadier, and accompanied by a heavier sea at a distance from the land than near it.

On the east coast of Africa it blows strongly from about south-southwest, following the land, and continues with full force through the channel between Sokotra and Ras Asir. In May it has been observed to be influenced by land and sea breezes near Ras Asir, the wind hanging a great deal to the southward and eastward, with heavy squalls, rain, and overcast sky.

Off Zanzibar and to the southward as far as Cape Delgado, the so-called southwest monsoon blows from south-southeast, hauling to south and south-southwest as it approaches the land.

From 20 to 40 miles from the coast of Africa, during the southwest monsoon, the following are the results of observations on wind and weather for a period extending over many passages by vessels of the British India Steam Navigation Co., namely:

From Zanzibar to latitude 4° north.—May, June, July: Strong southeast, south, south-southwest winds with rain. August: Light to moderate. September: Light south-southeast, south. October: Light, southerly.

From latitude 4° north to Ras Hafun—May: Light, variable, squalls, and rain. June: Strong wind, increasing, south-southwest. July, August: Moderate gale south-southwest. September: Strong wind, south-southwest. October: Light winds, calm, northeast to east, rain.

Ras Hafun to Ras Asir—May: Light variable winds. June, July, August: Strong gale, south-southwest. September: Strong wind, south-southwest. October: Light from east to northeast.

Weather signal.—A weather chart, from information telegraphed by the meteorological commission of the Union of South Africa, is exhibited, at each of the seaports in the colony soon after 10 a. m. daily, for the information of masters of vessels and others.

Barometer.—The average range of the barometer in the higher latitudes between 50° and 60° is about 1.5 inches, but extraordinary ranges of 2.75 and 3 inches have been recorded.

In the track of outward-bound vessels round the Cape of Good Hope, on the parallel of 40° south, the average height of the barometer is 29.9 inches, being about 0.15 higher in winter than in summer; it is higher toward the coast and lower toward the pole. The mean reading at Cape Town is 30.07, and at Durban 30.11; this, however, gives but an imperfect representation of the pressure in a district through which the areas of high and low pressure are constantly moving eastward, accompanying their respective systems of wind.

In the intertropical regions the range varies from 0.4 to 0.2 inch, and in the neighborhood of the Equator it seldom exceeds 0.15 inch, this small change being in great measure due to the regular diurnal variations, the barometer being highest at 10 a. m. and 10 p. m. and lowest at 4 a. m. and 4 p. m., and the difference about one-tenth of an inch. The average movement of the barometer within the Tropics being thus confined within small limits, any interruption of the law may be deemed a warning of the approach of bad weather.

The mean reading at Lourenco Marques is 30.02, at Beira 30.05, and at Mombasa 29.96. During the southwest monsoon period, at Mozambique it is 0.5 higher, but at Zanzibar it varies but little.

The fall of the barometer in and near cyclonic disturbances ranges from 1 to 2.5 inches; the rapidity of the fall and the depression of the mercury increase as the center of the storm approaches.

Currents—General remarks.—The primary cause of the currents on the south and east coasts of Africa is the great trade drift of the South Indian Ocean, which, advancing westward, and meeting with the obseruction caused by Madagascar, divides in the vicinity of Mauritius, forming two great streams, one flowing toward the northern end of Madagascar, the other toward the southern end; the strength of each stream being greatest as the island is approached at a few miles offshore.

The northern stream, flowing toward the Comoro Islands and the African coast at from 2 to 3 knots an hour, extends about 50 miles northward of Madagascar; beyond which, at times, a counter current runs northeastward at about 1 knot. During the southwest monsoon the main current strikes the African coast in the neighborhood of Cape Delgado, or southward of 11° south, but during the northeast monsoon, and especially in December, January, and February, it is as far north as latitude 10° or 9° south.

From the southern limit it again subdivides, one portion flowing southward through the Mozambique Channel along the coast, past Cape Corrientes and on to Natal. The southern portion of the main drift, having passed southward of Mauritius and of Madagascar, runs direct for Natal, uniting with the stream from the Mozambique, the two together forming the great Agulhas current.

During the southwest monsoon, the northern branch of the current dividing near Cape Delgado, flows northward past Zanzibar, and from thence to Ras Asir. During the northeast monsoon it is deflected eastward from the land before reaching the Equator, which it skirts on the southern side, or passes a little to the northward, thus forming a zone of counter current sometimes attaining a rate of 2½ knots, or even more, and extending as far southward as latitude 6° or 8° south. Both winds and currents in this zone are subject to great uncertainty.

The main currents will now be described in detail. Those prevailing off the various ports are mentioned with the local descriptions.

Agulhas current, occasioned by the two streams before mentioned, uniting northeastward of Natal in about latitude 28° 30′ south, longitude 35° east, forms an enormous body of warm water, which runs southwestward and westward, skirting the coast of Africa, and extending from 3 to about 120 miles off; it attains considerable velocity between Port Natal and the meridian of about 23° east, sometimes running with a velocity of from 3 to 4½ knots an hour, the greatest rate being near the edge of the bank.

In its progress southwestward the current becomes weaker, and on reaching the Agulhas Bank, does not, as a rule, run over the bank, but follows its edge with a tendency to branch off to the southward; in about longitude 22° east, the main body is deflected in that direction as far as the parallel of 40° south, from whence a large part, being opposed by the northeasterly set from the Antarctic, recurves eastward, thus flowing back into the Indian Ocean, but with diminished strength and temperature.

The Agulhas current does not appear to vary much in volume, strength, or direction throughout the year, although it is said to be checked at times by westerly gales and to run with increased strength afterwards; it usually attains great strength in the teeth of the gale, causing a high and dangerous sea, especially near the southeastern edge of the bank.

A small portion of the Agulhas current passing around and over the southern part of the Agulhas Bank, and branching off northwestward past the Cape of Good Hope, is joined by the connecting current of the South Atlantic Ocean, collectively forming a wide stream running northward along the coast, at from 1 knot to 1½ knots an hour, with sometimes a tendency to an indraft toward the coast which must be guarded against.

This warm water seldom reaches Table Bay, where the water is much colder than in Simons Bay, the sea temperature in the latter being from 62° to 64° in November, but during long northwesterly gales this warm water is occasionally driven out and replaced by water from the South Atlantic at a temperature of about 50° with a counter easterly set. At such times the northern branch of the Agulhas current is probably deflected southward with the main body.

Caution.—Although the southern edge of the Agulhas current has a tendency to set from the land, the northern or inner edge has a tendency to set toward it, and especially so when westward of Algoa Bay, where during and after southeasterly, westerly, or northwesterly gales the current is at times deflected from its general course and turned directly toward the land, forming a very dangerous element in the navigation of the southern coast of Africa.

This onshore set has caused the loss of a large number of vessels between Algoa Bay and Cape Agulhas, and the necessity of guarding against this danger, as well as against the inshore countercurrent mentioned below, can not be too strongly impressed on the mariner.

Agulhas countercurrent.—The remarkable recurving of the main body of the Agulhas current is due to the action of a polar or cold water current flowing from the southwest; the junction of the hot and cold waters of the two streams taking place off the Agulhas Bank giving rise to the confused sea, to the irregular set of the currents, and, by their effects on the atmosphere, to those severe and fitful gales experienced off the Cape of Good Hope and the coast of South Africa.

The meeting of these currents is frequently denoted by a confused and heavily breaking cross sea; the warm current is also indicated by a marked change in the color of the water, which, combined with the agitation of the sea, frequently conveys the impression of the vessel being in soundings.

The large body of water, deflected and turned eastward, runs chiefly between the parallels of 37° and 40° south, and, though its strength varies, its average rate may be about 1½ knots an hour. It is rather stronger and more northerly in the summer than in the winter, owing possibly in some degree to the melting of the ice in high southern latitudes and to the smaller amount of westerly winds experienced northward of latitude 40° south in summer. It expands wider than the Agulhas current, and eastward of longitude 28° east it is traced northward to about latitude 36° south. A current of 3 knots an hour has been experienced in latitude 39° south.

Inshore countercurrent.—Near the coast, between Capes Hangklip and Agulhas, the current occasionally sets in an east-southeast direction, or dangerously toward the land, with sometimes a rate exceeding in this locality 1 knot an hour; many vessels have been lost through not allowing for this possible set by keeping a sufficient offing.

Between Cape Agulhas and Kowie River, the latter in about longitude 27° east, an inshore current setting eastward at about the same rate is also frequently experienced in fine weather, and, except off the mouths of the rivers, it follows the trend of the land, extending probably from 1 mile to 6 miles off it.

Mozambique Channel Currents.—This channel, being screened by Madagascar from the free action of the currents in the Indian Ocean, but affected by the varying force of the streams flowing around or past either end of that island, as well as by many local disturbances, its currents are somewhat uncertain.

That portion of the northern branch of the Indian Ocean trade drift which subdivides in the neighborhood of Cape Delgado and turns southward along the Mozambique coast, flowing without intermission throughout the year, has a velocity varying from 36 to 72 miles in 24 hours during the northern monsoon, sometimes at its height attaining a rate of 100 miles in the same period and decreasing during the southern monsoon from 1 knot to 2 knots, sometimes being inappreciable during the strength of that monsoon.

The stream is strongest at from 60 to 80 miles offshore, although varying somewhat in volume, and eastward of it a counter or variable current is generally experienced; in the southern part of the Mozambique Channel the temperature of the water may indicate the presence of this countercurrent, and if below 68° it may be concluded that the ship is certainly eastward of the south-going stream.

Off Mozambique the current has been known to set southeast by east at a rate of 4 knots an hour; and 60 miles to the southward, from north-northwest to west-northwest at from 1 knot to 2½ knots; whilst sometimes under certain circumstances it has altogether ceased to run. At Cape Corrientes it sets almost constantly to the southward at about 2 knots an hour.

In the large bight of Sofala, on the African coast, commencing nearly as far to the southward as Cape Corrientes and extending northward beyond Kiliman, there is often a countercurrent setting northeastward and extending a considerable distance offshore; this, experienced especially off Sofala and during the strength of the southern monsoon, has been known to attain a rate of 35 miles in 24 hours in the month of May.

Between the Comoro Islands and the outer edge of the south-going coast current, and from thence southward until past the narrow part of the Mozambique Channel, no dependence can be placed on the direction or force of the current, as it may run with a velocity of 3 knots an hour for a day in one direction and at a similar rate in another direction on the next day.

In the vicinity of the Comoro Islands the current generally runs westward, but a little southward of them a countercurrent frequently sets eastward. Northward of these islands a northwesterly current of from 1 knot to 1½ knots an hour is generally found.

Between May and August, the strength of the southern monsoon, a current apparently sets northwestward from the southern extreme of Madagascar, as far westward as 40° east, up past Europa Island and then turns more northward, but it should not be depended on, and in the vicinity of that island, in November, a current has been experienced setting northwestward from 2 to 2½ knots an hour, causing strong tide rips, but neither rate nor direction of these currents may be the same for two consecutive days.

In the middle of the Mozambique Channel, southward of latitude 18° south, there is more often a northerly than a southerly current, the wind being generally from the southward.

It is stated, on the authority of an officer of the Union Castle Line, that the tide has a considerable influence on the currents, to the southward of Cape Delgado, and at a distance of not more than 10 miles from the coast, the stream of the rising tide setting with, and the other stream against, the current, which in the former case has its velocity sometimes doubled, and in the latter case may be entirely overcome; this tidal influence is greatest in the vicinity of Mozambique.

Caution.—The great strength, variety of direction, and general uncertainty of the currents in all parts of the Mozambique Channel renders it necessary for a ship's position to be constantly verified by observation. These rapid changes are especially remarkable near the Mozambique coast, near Europa Island, and along the western shore of Madagascar. In the last-named locality the current, usually of no great strength, appears to follow the direction of the wind;

sometimes, however, it changes to an opposite direction and with considerable strength, preceding a change of wind.

The currents on the coasts of Madagascar will be found fully described in the South Indian Ocean Pilot.

East African coast current.—The velocity of the north-going branch of the stream which, as before described, subdivides near Cape Delgado, is much influenced by the monsoons; its average rate is generally about 2 knots an hour, but during the southwest monsoon it runs past Mafia, Fungu Kizimkazi, Zanzibar, and Pemba Islands and channels at from 2 to 4 knots an hour; and, in the northeast monsoon, at from 1 knot to 2 knots an hour, as far as about latitude 2° south.

During the southwest monsoon the whole mass of water continues northeastward along the coast across the Equator toward Ras Hafun and Ras Asir, at from 36 to 100 miles a day; the greater rate has been experienced on the Equator near the coast, and also near Ras Hafun and Ras Asir during the strength of the monsoon, but it has been observed both by the Italian and German war vessels, stationed on this coast, that this northeast-going current is apparently at its least velocity between Pemba and Formosa Bay, from which it gradually increases in rate, until off the coast between Brawa and Warsheik, where it seems to attain its maximum, decreasing to the vicinity of Negro Bay and Ras Hafun.

The following rates were observed: Between Pemba Island and Formosa Bay, 1¾ knots; between Formosa Bay and Brawa, 3¾ knots; between Brawa and Warsheik, 5¾ knots; between Warsheik and Ras Asswad, 2 knots; between Ras Asswad and Negro Bay, 1¾ knots; and between Negro Bay and Ras Hafun, 1½ knots.

It passes through the channel between Ras Asir and Sokotra at about the same rate, the main body pursuing a northeasterly direction until it mingles with the current setting along the Arabian shore out of the Gulf of Aden. At Ras Asir the inshore portion of the current sets close around that cape and westward along the African shore; in the offing the direction may vary from north to east-northeast, but always toward the Asiatic shore.

The East African northerly coast current generally becomes weaker as the distance from the shore is increased, almost disappearing on the Equator, in from longitude 48° to 52° east, or about 300 miles from the land; the northerly current has also been found and lost at about 100 miles eastward of Zanzibar. In the early part of August it has been found setting nearly due westward, continuing so with little variation at from 1 knot to 2 knots an hour until northward of latitude 6° south, in longitude 49° east, from whence to the Seychelles, northward of that parallel, an easterly set of about ¾ knot an hour has been experienced.

About 150 miles southward of Sokotra there is a great whirl of current, caused possibly by the interposition of that island; or, it may be, that shoaler water exists at this spot; it commences about the parallel of Ras Hafun, when the current strikes off eastward to the fifty-fifth meridian, then to the southward, to the sixth parallel, whence it again curves to the northeastward, through west, forming a complete whirl. At the northern limit, the velocity is about 4 knots, but at the southern extreme only about 1 knot an hour. A very heavy confused sea is created by this whirl, and in making the coast of Africa from the eastward, care should be taken to avoid the strength of it by keeping well to the southward.

Although the strength of the coast current may be less near the end of the southwest monsoon, and at other periods capricious, yet, up to the first week in December, it is occasionally felt strongly as far as latitude 4° north; but as the time of the change of the monsoon varies, so at other periods the current may set to the southward a month or more earlier, and thus no dependence can be placed on the exact time of change.

During the northeast monsoon the northerly set from Cape Delgado meets the southerly set from the Arabian Sea and Sokotra, between Lamu and Castle Point in from latitude 1½° to 2½° south, the two producing an offset from the land. In the offing the southerly set continues, gradually curving eastward and forming the easterly set to the Seychelles in the track of the northwest monsoon.

The meeting, however, of the two currents in the vicinity of Castle Point (as at Cape Delgado) must be accepted with considerable limitation, as it probably varies with the season, extending southward according to the strength of the northeast monsoon, the full force of which is between December and March.

During the month of February, 1891, the southerly set of the current along the coast was experienced by several vessels, considerably southward of Lamu, the northeast monsoon being then unusually strong.

Although the current in the Arabian Sea sets southwestward from about the middle of October, it does not reach Mogadiscio, on the African coast, until about the second week in December; it is said to begin to run off that place almost invariably with bad weather from the northeast: at a distance from the land it sets southwestward a month earlier. It is also stated that the southwesterly current does not continue for a longer period than about three months, its strength generally being from 1 to 2 knots.

Temperature.—Southward of South Africa the temperature of the air and the sea is warmest in February and coldest in July, being strongly influenced by the temperature of the Agulhas current; near the coast it is 70° and 60°, and on the parallel of 40° south, it averages 62° and 56°, respectively, in these months, but the temperature is about 10° lower off the western than off the eastern coast, and along the south coast of Africa areas of great change are found between January and March, inclusive.

The range of sea temperature near the land is greatest in January and February, being about 20°: between August and October, both inclusive, it is less than 15°, and the area in which the range amounts to 15° is greatest in April. Off Natal the average temperature is 73°, and off the southeastern edge of the Agulhas Bank 67°. In the neighborhood of latitude 40° south, where the warm and cold currents meet, a 20° range of temperature exists throughout the year: its area is rather larger in the winter and spring than in the summer and autumn.

Ice.—Icebergs are rarely fallen in with off the Cape of Good Hope northward of latitude 40° south, or even of latitude 43° south, bergs having been seen northward of latitude 40° south only three times in the last 50 years: they were all in the vicinity of the cape, and in the months of April and September. It is, however, desirable to keep a lookout for them at all seasons.

Icebergs are most numerous near and southward of latitude 45° south, and between the meridians of 40° and 60° east. Between latitudes 45° and 50° south they may be met with anywhere westward of longitude 90° east; farther eastward they are very rare. Fogs are also prevalent southward of latitude 45° south. Icebergs are likely to be farthest north from November to February, and least so in June and July.

Between the Cape of Good Hope and Tasmania ice is seldom met with north of latitude 40° south. During the last 70 years only ten bergs have been reported northward of this, and they were in the immediate vicinity of the cape. Between latitudes 40° and 45° south they are mostly seen between longitude 40° and 60° east. Between latitudes 45° and 50° south, ice may be met with anywhere westward of longitude 90° east. Eastward of that meridian it is much rarer.

It will be observed that the liability to encounter ice is much increased the farther a vessel goes southward of latitude 40° south; and though the length of the days in summer in high latitudes decreases the danger of accident by night, yet the prevalence of fog, snow, and thick weather makes it quite possible for a vessel to run foul of an iceberg in the daytime, and mariners are cautioned accordingly.

Buoyage—Portuguese East Africa.—The term starboard denotes that side of a channel which is on the right or starboard hand when entering, and the term port hand is the left or port side under the same circumstances.

The starboard sides of channels are marked by red conical buoys, surmounted by a black staff and a black triangle.

The port sides of channels are marked by black conical buoys, surmounted by a black staff and a black cylinder.

German system.—The following uniform system of buoyage and beaconage is used for the purpose of marking channels and shoals:

The term starboard hand denotes that side of a channel which is on the right or starboard side when entering, and the term port hand is the left or port side under the same circumstances. The starboard hand of a channel connecting two parts of the sea, or two sheets of water, separated by banks, is that lying on the right side when entering from the westward, and the port hand is that on the left, the term westward including the whole of the western semicircle, from 180° to 360°.

Seaward entrances to channels, not marked by lightvessels, beacons, or moles, have buoys with cage-like superstructures; these, known as "Bakentonnen," are of the same color as the channel buoys, and are moored in such a position that the nearest channel buoys can be plainly seen from them.

Spar buoys, or can buoys, where several channels are near each other, or the water is not deep enough for spar buoys, are on the starboard hand, and painted red, and port hand buoys are conical and painted black.

The extremes of shoals extending from the shore, or branching fairways, are marked by buoys with topmarks.

The extremes of middle grounds are marked by buoys, painted red and black in stripes, and surmounted by a cross.

Mid-channel buoys, which may be passed on either hand, are spherical in shape, and painted red and black in stripes.

The edges of shoals, seaward of channels, are marked by white buoys and beacons, surmounted by vertically placed triangles, arranged as follows:

1. When on the northern edge of the shoal, both triangles pointing upward.
2. On the southern edge of a shoal, both triangles pointing downward.
3. On the eastern edge of a shoal, both triangles bases together.
4. On the western edge of a shoal, both triangles bases apart.
5. The topmark of a shoal so small that it can be marked by a single buoy or beacon, and be passed on either side, is a cylinder, the beacon or buoy being black and white in stripes.

The full, or abbreviated, name of a shoal is painted in black letters on the buoys or beacons marking it, also the letters "N.S.E." or "W." in black are on those marking, respectively, those sides of shoals.

Beacons, when used, are red on the starboard and black on the port hand, and piles of logs, known as Dalben (Duc d'Alben), are distinguished by those on the starboard hand having a pole as a topmark.

The starboard sides of small channels are marked by perches consisting of single stakes, with or without branches or brooms as topmarks, and the port sides of the same channels are marked by pricken, consisting of branches, or young trees with branches.

Wrecks marked by lightvessels have these painted green, with "Wrack" in white letters on the sides, and they do not show anchor lights.

Lightbuoys marking wrecks exhibit a green flashing or occulting light, and a wreck itself when marked by lights has a green light over a white one.

Pilot vessels' lights.—Pilot vessels, when engaged on their stations on pilotage duty, do not show the lights required for other vessels, but carry a white light at the masthead, visible all around the horizon, and also exhibit a flare-up light, or flare-up lights, at short intervals, never exceeding 15 minutes.

On the near approach of, or to, other vessels, their side lights are shown or flashed at short intervals, to indicate the direction in which they are heading, but the green light shall not be shown on the port side, nor the red light on the starboard side.

A pilot vessel of such a class as to be obliged to go alongside a vessel to put the pilot on board may show the white light instead of carrying it at the masthead, and instead of the colored side lights, may use a lantern with a green glass on one, and a red glass on the other side, to be used as prescribed above.

A steam pilot vessel, exclusively employed for the service of pilots, licensed or certified by any pilotage authority, or the committee of any pilotage district, when stationed on pilotage duty and not at anchor, shall in addition to the lights required for all pilot vessels, carry at a distance of 8 feet below the white masthead light, a red light visible all around the horizon, and of such a character as to be visible from a distance of at least 2 miles, on a dark night and with a clear atmosphere, and also shall carry the side lights required to be carried by vessels when under way.

A similar vessel when stationed on pilotage duty and at anchor shall carry, in addition to the lights required for all pilot boats, the red light before mentioned, but not the colored side lights.

Pilot vessels, not engaged on their stations on pilotage duty, shall carry lights similar to other vessels of their tonnage.

Steering commands.—The system of steering commands, in which the terms starboard and port signify that the vessel's head is to be directed to starboard and port, and not the helm, have been adopted by France, Germany, Portugal, and Spain.

Tides.—High water, full and change, which is about 11 hour 40 minutes at the Cape of Good Hope, is nearly 2 hours later at Port Natal, the latter establishment being approximately maintained along the east coast of Africa to the Equator, and being about 2 hours later at Ras Asir. The spring rise, from 4 to 6 feet in South Africa, is maintained to the southern boundary of Portuguese territory, and then increases until it is 20 feet at Beira, but on the remainder of the coast, as far north as Kismayu, it varies between 10 and 15 feet, decreasing to 6 feet at Ras Hafun.

Variation of the compass.—The variation of the compass at the Cape of Good Hope is about 27° 20′ west; at Zanzibar, 5° 0′ west; at Delagoa Bay, 18° 40′ west; and the line of no variation passes near Ras Hafun. The variation decreases about 5′ annually at the Cape of Good Hope, this decrease becoming 10′ annually near Algoa Bay, and this amount of change continues along the coast as far as Zanzibar, from which the annual decrease becomes less and is about 2′ annually at Ras Asir.

Lloyd's signal stations.—There are Lloyd's signal stations at Cape Point, Cape of Good Hope, Cape Agulhas, Cape St. Francis, Cape Recife, and the Bluff, Port Natal; at the last station arrangements have been made to receive pyrotechnic night signals, also to receive and transmit night signals by Morse code.

Life saving stations.—Lifeboats and rockets apparatus are stationed at East London, Port Elizabeth, Port Natal, and Table Bay; and there are rocket stations at Port Alfred, Cape Hermes, Port St. John, Cape St. Blaize, Port Shepstone, Simons Bay, and Umgeni River.

Naval establishment.—The only naval establishment belonging to His Majesty's Government is at Simons Bay, where there is a dockyard with a dry dock, basin, cambers, jetties, etc.

Coal—A stock of coal, amounting to more than 500 tons, is kept at each of the following places: Mossel Bay, Port Elizabeth, East London, Port Natal, Lourenço Marques (Delagoa Bay), Mozambique, Mombasa, Kilindini, and Zanzibar, and less than 500 tons will probably be found at Beira and Tanga. The amount stocked, with facilities for coaling, is given with the descriptions of the several places.

Docks.—There is a dry dock at Simons Bay, floating docks at Port Natal and Dar es Salaam, and patent slips at Simons Bay, Mossel Bay, Port Elizabeth, East London, and Port Natal. The dimensions of these docks and slips, with all information concerning them, will be found in Appendix II.

British consular stations—Portuguese East Africa.—Consuls and vice consuls are stationed at Chinde and Lourenço Marques, and vice consuls at Beira, Mozambique, and Kilimán.

Regulations—South Africa—Signals regarding searchlights.—Any vessel approaching a defended port in the Union of South Africa when searchlights are being worked, and finding that they interfere with safe navigation, may make use of the following signals, either singly or combined:

(*a*) By flashing lamp, four short flashes followed by one long flash.

(*b*) By whistle, siren, or fog horn, four short blasts followed by one long blast.

Whenever possible, both flashing lamp signals and sound signals should be used.

On these signals being made the searchlights will be worked, as far as circumstances will permit, so as to cause the least inconvenience, being either extinguished, raised, or their direction altered.

The signals, which should be repeated until the inconvenience is removed, are not to be used without real necessity, as unless the vessel is actually in the rays of the searchlight it is impossible to know which searchlight is affected.

These signals are designed to assist mariners and do not render the Government liable in any way.

Passages—General remarks.—Full-powered steam vessels always make their passages by the most direct possible safe route, with occasionally some slight divergence to secure a favorable current or to avoid a heavy sea, etc.

Low-powered steam vessels usually take nearly the same route as sailing vessels, but in some cases they may take the full-power steam route, being guided by the extent of their steaming capacity.

Sailing vessels adopt the routes by which they are most likely to be favored by leading winds and by current, distance being a secondary consideration and often greatly increased.

Rounding the Cape.—There is but little difficulty for vessels of either class in passing eastward around the Cape of Good Hope at any time, though a greater proportion of gales will be met with from April to September, the winter season.

From the South Atlantic or from the Cape of Good Hope low-powered steam or sailing vessels, bound eastward, are recommended to cross the meridian of 20° east in latitude 39° or 40° south. Vessels may make quicker passages by going farther to the southward, especially from November to March, but better weather will, as a rule, be found on or about the parallels recommended. Should a southeasterly wind be blowing on leaving Table or Simons Bays, stand boldly to the southwestward until the westerly winds are reached or the wind changes to a more favorable direction.

In all cases where vessels are making for the fortieth parallel southward of the Cape of Good Hope they should steer nothing eastward of south, so as to avoid the area southeastward of the tail of Agulhas Bank, where gales with heavy and dangerous breaking cross seas prevail. If not bound for an Australian port or beyond, the amount of easting to be made depends on the prevailing monsoon in the Indian Ocean, for which see the passage required.

From October to April easterly winds prevail as far south as the tail of the Agulhas Bank (about 37° south), with variable but chiefly westerly winds beyond it. In May and September, at the tail of the bank, easterly and westerly winds are in equal proportion, but between these months westerly winds prevail, extending sometimes close in to the coast.

June, July, and August are therefore the worst months and January and February the best months for low-power steam or sailing vessels proceeding westward around the Cape of Good Hope, and it should be borne in mind that there is much less sea on the Agulhas Bank in depths of from 60 to 70 fathoms or less during heavy gales than there is near its edge and southward of it. If it is found necessary to heave-to, the port tack should be chosen, as, with the exception of southeasterly gales beginning with southeasterly winds, the shift of wind is almost invariably against the hands of a watch, and the vessel will come up to the sea.

Caution.—Mariners should remember that off all parts of the south coast of Africa, and especially off salient points, sunken wrecks or uncharted dangers may exist close to the shore, and that it is not advisable to approach this surf-beaten shore, even in full-powered steam vessels, within a distance of 3 or 4 miles, and sailing vessels should give Cape Agulhas a berth of 7 or 8 miles. With a strong adverse current the temptation to approach the shore is great, but westward of Algoa Bay nothing is to be gained by so doing, and a breakdown in the machinery or any temporary error in the course may lead to disaster.

Routes.—The following are the routes to and from more or less distant ports found by experience to be the best and most suitable for each of the three classes of vessels named:

Great Britain to the Cape of Good Hope—Full-powered steam vessels.—As direct as possible, giving a wide berth to Ushant and to Cape Finisterre, remembering that the current from the Atlantic sets directly on the coast; from thence, steer direct for, and through, the Canary Islands, proceeding along the coast of Africa, skirting, as near as circumstances permit, the shoals off it until well southward of Sierra Leone, when the Equator should be crossed in about longitude 9° west and the cape steered for direct. The distance from Plymouth to the cape by this route is 5,840 miles.

Near this line of route coal may be obtained at the following places, the distances given against each being from Plymouth: Vigo, 550 miles; Lisbon, 768 miles; Madeira, 1,213 miles; Las Palmas, 1,428 miles; Sierra Leone, 2,749 miles; and St. Helena, 4,224 miles; the distance to the Cape of Good Hope being 5,874 miles.

An alternative route, after passing Sierra Leone is to coast along Africa as far as Cape Palmas and then steer for the cape, crossing the Equator in about longitude 2° west and curving in toward the coast, which enables a vessel to call at the Kongo or at St. Paul de Loando for coal. The distance by this route is about 6,000 miles.

The steam vessels of the Shaw, Savill, and Albion Co., the New Zealand Shipping Co., and the White Star Line adopt the following route: After leaving the English Channel and passing Ushant at a distance of 20 miles, course is shaped to pass 50 miles westward of Cape Finisterre, between Tenerife and Grand Canary Islands, and at least 60 miles from Cape Blanco, Cape Verde, and the Bijouga Breakers, crossing the Equator in longitude 10° west, whence a direct course for Green Point, Cape Town, is shaped, or if not calling at Cape Town, passing 50 miles westward of the Cape of Good Hope, and thence to a position in latitude 43° 10′ south, longitude 40° east.

Sailing route.—A sailing vessel, on leaving the English Channel, should immediately make westing, to counteract the prevailing winds from that quarter, and even with a fair wind off the Lizard a west-southwest course should be steered, until an offing is gained in longitude from 10° to 12° west. Should the wind be from the westward, the tack which will enable the vessel to gain this offing, and so keep clear of the Bay of Biscay, should be taken, even standing to the northwestward until well able to weather Cape Finisterre on the starboard tack.

Nothing is lost by making a long board to the westward, for the wind will generally veer, and when put on the other tack the vessel will probably be able to pursue a course with a free wind; whereas, if embayed in the Bay of Biscay, any changes of wind to the westward would necessitate beating to windward against the current.

A vessel from Liverpool should pass to the northward or southward of Ireland, as most convenient, considering the direction of the wind when leaving.

Cape Finisterre should be given a wide berth, as the current from the Atlantic sets usually directly on shore in that locality, and from longitude 10° or 12° west a course should be steered to pass Madeira at any convenient distance; but in winter it is preferable to pass to the westward of it, as the strong westerly gales between November and January, inclusive, produce heavy squalls and eddy winds to the eastward of that island. From Madeira pass westward and only just in sight of the Cape Verde Islands, as the winds are stronger and steadier to the westward than to the eastward of those islands.

The positions for crossing the Equator vary considerably at different seasons of the year, the direction of the southeast trade wind being more southerly when the sun is north than when south of the Equator; and although a vessel crossing well to the westward will have less interval of doldrums to pass through, still it might become necessary to tack to weather the South American coast. From a large number of logs of vessels examined by the meteorological office, the following crossings are deduced:

From January to April, stand to the southward on about the meridian of 26° west, and when the southerly winds are met with, keep on the tack which gives most southing, endeavoring to cross the Equator not westward of longitude 26° or 28° west.

In May, do not cross to the westward of longitude 25° west.

In June and July, when the southerly winds are first encountered, probably in latitude about 6° north in June and 10° north in July, keep on the starboard tack as long as any southing can be made until a fair amount of easting has been obtained, and cross the Equator in about longitude 25° or 26° west.

In August the requisite easting should be made with the first of the southwesterly winds in latitude 10° or 12° north and the Equator crossed in about longitude 23° west. In September, proceed as in August, but cross the Equator in about longitude 25° west.

In October, proceed also as in August, but the southerly winds will first be met with in latitude 8° or 7° north, and the Equator should not be crossed to the westward of longitude 28° west.

In November and December, keep slightly to the eastward so as to cross longitude 25° west in about latitude 6° north; then take the tack which gives most southing and cross the Equator not westward of longitude 29° west.

The equatorial current is not so strong in the northern winter as in the summer and autumn months, but it should be remembered that its strength increases as it nears the American coast.

The position of the vessel should be frequently checked by observations, so that the set of the current may be allowed for when in the vicinity of the St. Paul Rocks, a good lookout being kept, as they are steep-to and are only visible about 10 miles in clear weather. Similar precautions are necessary when passing westward of Fernanda Noronha and approaching the dangerous Rocas Reef, although a light is exhibited from it.

Having crossed the Equator according to the foregoing directions, a vessel should stand across the southeast trade wind on the port tack, although falling off even to west by south, as the wind will draw more to the eastward farther south and will probably be east at the southern limit of the trade; vessels usually sight Trinidad Island to check the chronometers and obtain a fresh departure.

During the greater part of the year the southeast trade wind fails on a line drawn from the Cape of Good Hope to Trinidad and Martin Vaz Islands, this limit varying about 3°, according to the position of the sun. When to the southward of the southeast trade, fresh winds, but variable in direction, will be met with, and those from northeast, through north, to northwest, if accompanied by cloudy weather, often shift suddenly to southwest or south, but sometimes the wind steadies between west and west-southwest.

From Trinidad Island a course to the southeastward should be shaped to cross the parallel of 30° south in about longitude 22° west, and the meridian of Greenwich in about latitude 35° to 37°, from which to the Cape of Good Hope westerly and southerly winds usually prevail.

After passing the meridian of Greenwich a strong north-going current is frequently experienced, and if bound to Table Bay great attention to the set of the current is necessary when nearing the land, where a strong north-going current is almost constant, as it might cause considerable difficulty and loss of time in reaching the bay. Bound to Simons Bay, during the summer months, the land should be made about Cape Hangklip, as a strong current sets at that period across the entrance to False Bay toward Cape Point.

Approaching the Cape of Good Hope from the westward, Cape Point Light should be visible in clear weather from a distance of 36 miles, except where it is obscured by the land, and a vessel near the coast by night, with the land not visible, should be kept to the southwestward until the position is ascertained.

The wind seldom blowing from east or northeast (directly off the peninsula), sailing vessels, bound for Table Bay or around the Cape of Good Hope, should insure a weatherly position to the northward or southward, according to the season, and vessels bound for Simons Bay are sometimes detained for several days by southeasters off Lions Head and Hout Bay, in consequences of making the land too far to the northward, during the summer season, when the same winds would have been fair had they been about 30 miles farther south.

During the winter season a vessel may find it difficult to make Table Bay from a position off the Cape of Good Hope during the continuance of north or northwest winds, notwithstanding the generally prevalent north-northwest current.

Low-powered steam vessels.—The same route should be followed as that for sailing vessels, except with a calm when leaving or foul wind, if not too strong, a good offing should be obtained on a west-southwest course from the English Channel until well able to weather Cape Finisterre, and the Equator should at all times be crossed in about longitude 23° west.

The distance by the sailing and low-powered steam route from Plymouth to the Cape of Good Hope is about 7,450 miles, but it varies considerably according to the season.

Return route—Full-powered steam vessels.—The reverse of the outward route.

Sailing vessels.—A good offing to the northwestward should be obtained at once, as squalls from northwest and west-northwest are not uncommon at all seasons until well clear of the land, and, an offing being obtained, course should be shaped for St. Helena in cloudy weather, getting on its parallel well to the eastward if going to call there to avoid missing it.

From St. Helena steer direct for Ascension, passing it from 10 to 20 miles distant on either side and crossing the Equator between longitudes 25° and 30° west (or in July, to insure better winds, between longitudes 20° and 25° west). Then a northerly course should be made to gain the northeast trade, in July and August crossing latitude 10° north in about longitude 25° west, running through it until it is lost, which will probably be in about latitude 26° or 28° north and longitude from 38° to 40° west, when westerly winds may be expected and a course shaped for the English Channel.

It is seldom advisable to pass eastward of the Azores, but if the wind shifts to northwest when near them, the most convenient passage between the islands may be taken. Should easterly winds be encountered after passing these islands, it is best to keep on the starboard tack, when westerly winds will probably be soonest found.

Low-powered steam vessels.—Similar to the sailing route, but crossing the Equator in about longitude 20° west; or from the Cape of Good Hope make direct for the Cape Verde Islands and thence, running through the northeast trade as before, pass near the Azores as in the sailing route. From June to September a vessel might pass eastward of the Cape Verde Islands, where southwesterly winds are then prevalent.

New York to the Cape of Good Hope—Full-powered steam vessels.—A direct course should be steered unless coal is required, in which case the great circle route to St. Vincent, Cape Verde, may be taken and thence direct to the Cape of Good Hope. By direct course the distance is about 6,800 miles; by the great circle course to St. Vincent the distance is increased by 60 miles, but considerable adverse current is avoided.

Sailing vessels from New York cross latitude 30° north in about longitude 35° west and then run to the southward through the northeast trade wind, steering so as to cross the Equator between longitudes 23° and 29° west nearest to the former in August and to the latter in November and December. On entering the southeast trade wind proceed as already described from the English Channel.

Low-powered steam vessels.—Similar to the sailing route, but crossing latitude 30° north, 5° or 6° westward, and crossing the equator in about longitude 25° west at all seasons.

Return route.—Direct for all classes of vessels.

St. Helena to the Cape of Good Hope.—Full-powered steam vessels take the direct course both ways, the distance being 1,700 miles.

Low-powered steam and sailing vessels' route.—Stand to the southward on the port tack through and out of the southeast trade wind and then southeastward, crossing the meridian of Greenwich between latitudes 35° and 37° south and keeping between these parallels, as in the passage from England to the Cape of Good Hope, making the cape from the southwestward.

Return route.—Direct for all classes of vessels, but sailing vessels should get a good offing on leaving the cape in order to avoid the squally weather so prevalent near the land and then shape course for St. Helena, making it from the eastward on its parallel in cloudy weather to avoid the risk of missing it, as although high it is frequently hidden by cloud or mist.

Rio Janeiro to the Cape of Good Hope.—Full-powered steam vessels should take the great circle track. Distance 3,270 miles.

Low-powered steam and sailing vessels should keep as much southward of the great circle as the rhumb line is northward of it (it is about 40 miles longer than the great circle), crossing the meridian of 30° south, 20° west in latitude 35½° south, 10° in latitude 37° south, the meridian of Greenwich in latitude 37½° south, and 10° east in latitude 37° south, making the Cape of Good Hope as before from the southwestward.

Return route.—Full-powered steam vessels should follow the rhumb line. Distance, 3,310 miles.

Low-powered steam and sailing vessels should keep well within the southern limit of the southeast trade wind until nearing Trinidad Island, and then edge off toward Rio Janeiro.

Montevideo to the Cape of Good Hope—Full-powered steam vessels should not go to the southward of latitude 36° south until in longitude 25° west; from thence follow the great circle track, which passes just southward of Tristan da Cunha Island. By this route ice is usually avoided. Distance, 3,640 miles.

Low-powered steam and sailing vessels should follow the route for full-powered steam vessels until past Tristan de Cunha; then keep on the parallel of about latitude 37° south, until the Cape of Good Hope bears about northeast, when steer direct for it.

Return route.—Full-powered steam vessels should follow the rhumb line the whole distance, 3,710 miles; or, follow the rhumb line toward Rio Janeiro as far as longitude 20° west, and then that to Montevideo; the distance by this latter route is about 180 miles greater, but it is most probably more than made up for by lighter winds and favorable currents.

Low-powered steam and sailing vessels should keep well within the southern limit of the southeast trade wind until nearing Trinidad Island; from thence direct.

Cape of Good Hope through Mozambique Channel.—Full-powered steam vessels should at all seasons shape a direct course, keeping at a safe distance along shore as far as Algoa Bay, thus avoiding the strength of the Agulhas current, and being sometimes assisted by a countercurrent extending from 1 mile to 6 miles offshore, especially between Cape Agulhas and Kowie River, but guarding against indraft and avoiding all salient points.

From Algoa Bay, if calling at Natal, continue the coasting passage, but if not calling there or at other intermediate ports, a vessel should edge off to about 80 or 100 miles from the coast, where the current is weak, and from thence steer direct for the middle of the Mozambique Channel, edging in again for Port Mozambique when nearing it, if bound for that port, but bearing in mind that the current runs from 2 to 4 knots to the southward when within about 60 or 70 miles of that coast, and is at its strongest during the northeast monsoon.

If bound for Zanzibar, pass westward of the Comoro Islands, and from thence direct, sighting the northern end of Mafia Island and passing inshore of Fungu Kizimkazi (Latham Island).

On account of the uncertain set of the currents in the Mozambique Channel, frequent observations for ascertaining a vessel's position are imperatively necessary.

If bound to Aden, after passing through the Mozambique Channel as directed, take the most direct route for Ras Asir, and rounding it, steer direct for Aden. In rounding Ras Asir, see Red Sea and Gulf of Aden Pilot.

Distances.—The full-power distances from the Cape of Good Hope to the principal ports on the south and east coasts of Africa are as follows: To Algoa Bay, 390 miles; to Port Natal or Durban, 780 miles; to Delagoa Bay, 1,090 miles; to Beira, 1,550 miles; to Mozambique, 1,850 miles; to Zanzibar, 2,470 miles; to Mombasa, 2,590 miles; and to Aden, 3,980 miles.

Sailing vessels.—From October to April, when the prevailing winds on the southern coast of Africa are easterly, and at any season if southeasterly winds are blowing, a vessel should first make southing until in latitude 39° or 40° south, or even farther southward in the month of January, when, with favorable winds and current, easting may be made until about on the thirtieth meridian.

From this, edging gradually to the northward, the fortieth meridian may be crossed between latitudes 32° and 33° south, the course inclined still more to the northward, and the thirtieth parallel crossed in 42° east, from thence about true north, an allowance being made for southwesterly current, and so continuing past the western side of Madagascar, at a convenient distance outside the reefs.

In this track, vessels will avoid the strongest part of the southwesterly current, and will be nearly sure of a fair wind until about half-way through the Mozambique Channel, when adverse winds may be expected; should such occur, it is better to make easting on the port tack rather than westing, thus avoiding the African coast with its prevailing southerly current.

The passage on the eastern side of Europa Island is recommended, but vessels should not approach that island nor the Bassas da India Reef at night, the currents in their vicinity being very strong and uncertain. If bound to Mozambique, edge in when abreast, and make the land northward of it, as both wind and current at this season tend to set a vessel to the southward. Vessels bound to the northwestern coast of Madagascar should pass close westward of the island of Juan de Nova, and when near the Madagascar coast, advantage may be taken of the alternating land and sea breezes.

If bound for Bombay, for African ports northward of the Mozambique Channel, or for Aden, it is often preferable to avoid that channel altogether and to pass eastward of Madagascar. With this intention, after leaving the Cape of Good Hope, easting should be made in about latitude 39° or 40° south, until in about longitude 45° east, when the vessel should edge away northeastward, crossing latitude 30° south in about longitude 53° east, afterwards standing to the northward, passing westward of Reunion and around the northern end of Madagascar, from whence both wind and current are favorable for Zanzibar; this route can be taken all the year round.

From April to October, inclusive, when westerly winds prevail off the Cape of Good Hope, vessels may make the first part of the passage near the coast, where they will sometimes be favored by a countercurrent, but must guard against indraft. They should not, however, go northward of about latitude 35° south until in longitude 37° east, crossing latitude 30° south in about longitude 42° east, and afterwards passing northward through the Mozambique Channel as before directed, carrying probably at this season a fair wind right through.

On leaving the Cape of Good Hope, if southeasterly winds prevail, vessels should at once stand to the southward and make their easting in latitude 39° or 40° south. In all cases vessels making for these parallels should steer nothing to the eastward of south, in order to avoid the area, southeastward of the tail of the Agulhas Bank, where gales and heavy cross seas prevail.

When nearing Mozambique, if calling there, edge in for it, allowing for the strong south-going current when within 60 or 70 miles of the African coast.

If bound to Zanzibar, pass westward of the Comoro Islands, and from thence direct, sighting the northern end of Mafia Island and passing inshore of Fungu Kizimkazi.

Vessels should enter Zanzibar from the northward during the northeast monsoon, November to March, and from the southward during the southwest monsoon, April to October.

Low-powered steam vessels—October to April.—The same as the sailing route, but using steam in the Mozambique Channel, when calms or northerly winds are met with. If bound northward of the Mozambique, the route eastward of Madagascar should be taken, in which case, probably, steam would not be required.

From April to October.—As in the sailing route through the Mozambique Channel. In all probability steam would only be required in the event of meeting with calms or light winds in that channel.

If bound to Aden—October to April.—Sailing vessels stand to the southward from the Cape of Good Hope, and make easting in latitude 39° or 40° south (or even farther south in January) to about longitude 50° east. From thence, stand northeastward and cross latitude 30° south in about longitude 59° east and then run to the northward through the southeast trade wind and the northwest monsoon. Cross the Equator in about longitude 68° east, and from thence steer direct for the Gulf of Aden, passing northward of Sokotra, if possible.

From April to October.—Proceed either through the Mozambique Channel, or take the passage eastward of Madagascar as described at page 55, and when clear of Madagascar, make direct as possible for Ras Asir, rounding it and working along the African coast as far as Burnt Island before standing across to Aden.

Low-powered steam vessels.—October to April.—Follow the sailing route eastward of Madagascar for this season. Steam will probably be required between the southeast trade wind and the northwest monsoon, and again between the northwest and northeast monsoons.

April to October.—Take the sailing route through the Mozambique Channel, using steam after rounding Ras Asir.

Return routes—October to May, inclusive—Full-powered steam vessels.—Direct to Ras Asir, then direct for and through the Mozambique Channel, keeping in the strength of the Mozambique and Agulhas currents as far as Mossel Bay, and from thence steer direct for and round Cape Agulhas.

June to September, inclusive.—After rounding Ras Asir, steer to cross the Equator in about longitude 55° east, and thence make for the Mozambique Channel and Cape of Good Hope as before. The distance by this route is 4,260 miles, about 280 miles more than by the other, but this excess of distance is more than compensated for at this season by the avoidance of strong head winds and current.

Sailing vessels—May to September.—Pass northward of Sokotra, run through the southwest monsoon, cross the Equator in about longitude 72° east, or even run through the One-and-a-half degree Channel and then cross the Equator, thence making southing into the southeast trade wind, passing eastward of the Chagos group. Run through the southeast trade, passing southward of Mauritius and about 100 miles southward of Madagascar, and make the African coast about 200 miles southward of Natal. From thence keep in the strength of the Agulhas current until abreast of Mossel Bay, and hence direct round Cape Agulhas. With westerly winds, after passing Algoa Bay, keep within 40 or 50 miles of the shore.

October to March.—Work along the Arabian coast until able to weather Ras Asir, then run down the coast of Africa and through the Mozambique Channel, taking advantage of the full strength of the Mozambique and Agulhas currents as before.

Low-powered steam vessels—May to September.—The same route as sailing vessels at this season, but using steam through the variables between the southwest monsoon and the southeast trade wind.

October to March.—The sailing route for the season, but steaming out of the Gulf of Aden, and also if meeting with southerly winds in the Mozambique Channel.

Return route from Zanzibar, etc.—Full-powered steam vessels.—Direct along shore at all seasons, as described through the Mozambique Channel from Aden. Distance to the Cape of Good Hope from Zanzibar 2,400 miles, and from Mozambique 1,830 miles.

Sailing vessels—Northeast monsoon, October to April.—Keep well off the land until up to Cape Delgado, as the wind sometimes hangs well to the eastward and even southward of east; from thence, stand down the coast, inside the Lazarus Bank, keeping in the strength of the Mozambique and Agulhas currents and making Cape Agulhas. A vessel will probably have to work to windward in the southern part of the Mozambique Channel, the prevailing winds there being southerly.

Southwest monsoon, April to October.—Stand out to the eastward on the starboard tack until able to weather Cape Delgado on the port tack, then make the best of the way down the coast, keeping in the strength of the current, and acting as previously directed along the southern coast.

Low-powered steam vessels take the sailing route, but use steam against light contrary winds. In the southwest monsoon, on leaving Zanzibar, a vessel will gain by using the Mafia Channel, where smoother water and less adverse wind and current are found.

Cape of Good Hope to Bombay (possibly touching at Seychelles or Mauritius).—This route is given because vessels taking it and requiring to replenish their coal, can not depend upon doing so to any great and certain extent except either at Seychelles or Mauritius.

Full-powered steam vessels proceed from the Cape of Good Hope through the Mozambique Channel as already directed, passing westward of Mayotta Island and of the Cosmoledo group, and thence direct to Bombay. Distance, 4,582 miles. If calling at Seychelles for coal, after passing Juan de Nova Island, a vessel should steer as direct as possible for Seychelles and from thence to Bombay, the distance in this case being increased by about 25 miles only.

If passing eastward of Europa Island, in the Mozambique, the distance in each case is about 40 miles greater, but the currents are more favorable.

An alternative route is to round the south end of Madagascar, at about 200 miles distant, and from thence steer direct for Bombay, but calling, if necessary, at Mauritius or Seychelles for coal. By this route the distance is 4,750 miles, but if calling at either of the islands named, it is about 70 miles farther.

Sailing vessels—April to October.—Four distinct routes may be taken during this season, viz, by the Mozambique Channel, east of Madagascar, the Boscawen Passage, and the Middle Passage.

The Mozambique Channel route should only be taken when certain of reaching India before the close of the southwest monsoon. By it, a vessel after passing Juan de Nova Island, should pass through the Comoro Islands, cross the Equator in longitude 53° or 54° east, and then steer direct for Bombay.

The passage eastward of Madagascar should also be taken only when certain of reaching port before the end of the southwest monsoon; it is often preferred to the Mozambique Channel, as less dangerous and the winds being more steady, especially in August and September, when light and variable airs prevail in that channel. Proceed by it as directed, passing westward of Reunion and of the Amirante Islands, and having crossed the Equator in longitude 53° or 54° east, steer direct for Bombay.

The Boscawen Passage is to be preferred when there is doubt as to reaching port before the beginning of the northeast monsoon. Proceed as before from the Cape of Good Hope, but make easting to about longitude 50° east, then edge away northeastward and cross the parallel of 30° south in about longitude 59° east; from this run northward through the trades, passing between Reunion and Mauritius, and westward of the Saya de Malha Bank, and crossing the Equator in about 62° east steer direct for Bombay.

The Middle Passage is sometimes adopted by vessels toward the end of the southwest monsoon, but it is not recommended, as calms and light winds are more likely to be expected than by the Boscawen Passage. The difference between the two passages consists only in crossing the Equator from 6° to 8° farther eastward of it than by the Boscawen Passage.

In case the northeast monsoon has commenced, vessels should close with the land after passing the Maldive Islands.

November to March.—From the Cape of Good Hope stand to the southward and make easting in latitude 39° or 40° south, or even farther southward in January, until in longitude 65° east, then stand to the northward and enter the southeast trade wind in from latitude 26° to 28° south and longitude 80° to 83° east. Run through the trade and northwest monsoon, and cross the Equator in from 80° to 85° east, the farther eastward the safer, and having made northing into the northeast monsoon, stand for Cape Comorin and work up the Malabar coast, taking advantage of the land and sea breezes.

Low-powered steam vessels—April to October.—Follow either of the sailing routes described and under the same conditions. The distances are, by the Mozambique Channel route (according to the parallel on which easting is made), from 4,930 to 5,370 miles, by the east of Madagascar route 5,740 miles, and by the Boscawen route 5,760 miles.

November to March.—As in the sailing route, but crossing the Equator in from 80° to 81° east and steaming into the northeast monsoon as well as along the Malabar coast.

Return route—Full-powered steam vessels.—Direct for the Mozambique Channel and by it to the Cape of Good Hope. During the height of the southwest monsoon steer to cross latitude 5° north in about longitude 65° east, thus avoiding the strongest part of the monsoon. From thence pass westward of the Seychelles and then down the Mozambique Channel as before.

Sailing vessels—February to October.—Stand down the coast of India and across the Equator into the southeast trades, then steer to pass southward of Mauritius and about 100 miles southward of Madagascar and make the African coast about 200 miles southwestward of Port Natal. From thence keep in the strength of the Agulhas current until abreast of Mossel Bay and then direct round Cape Agulhas.

In the early part of the monsoon during June and July, when the wind is more southerly than later on, vessels should get an offing from Bombay into about 50 fathoms water before standing down the coast, afterwards keeping in about 40 or 50 fathoms to insure being well inshore of the Laccadive Islands.

November to January.—Direct through the Mozambique Channel and along the African coast, keeping in the strength of the Mozambique and Agulhas currents. In rounding the Cape of Good Hope, if westerly winds prevail, keep on the Agulhas Bank at not more than 40 or 50 miles from the coast, where the sea is smoother than elsewhere.

Low-powered steam vessels—March to October.—The same as the sailing route.

November to February.—As in the sailing route through the Mozambique Channel.

Cape of Good Hope to Calcutta and Bay of Bengal, etc.—Full-powered steam vessels.—In this passage also it is frequently necessary to call at either Seychelles or Mauritius for coal, according to the route taken, there being two. One, through the Mozambique Channel, calls at Seychelles, as just now described, and from thence through the One-and-a-half Degree Channel and round the south end of Ceylon. The other, passing 200 miles southward of Madagascar, and coaling at Mauritius, is then direct round the southern end of Ceylon.

By the first route, at all seasons, there will be less adverse wind and less sea to encounter than by the second and, in consequence, less wear and tear to a vessel.

The distances are as follows: From the Cape via Seychelles to Trincomali, 4,730 miles; to Madras, 5,000 miles; to Calcutta and to Rangoon, 5,640 miles. The distances to the same places via Mauritius are about 130 miles less in each case.

Return route.—Direct past the southeastern end of Ceylon and eastward of the Chagos group, calling at Mauritius, if necessary, for coal, and making the African coast as before directed, about 200 miles southwestward of Natal; from thence, keep in the strength of the Agulhas current until abreast of Mossel Bay, proceeding as direct as possible around Cape Agulhas. The return distances are less than the outward ones, thus: From Calcutta and Rangoon to the Cape of Good Hope, 5,510 miles; from Madras, 4,870 miles; and from Trincomali, 4,600 miles.

From Rangoon, during June, July, and August, it is best to pass eastward of the Andaman and Nicobar Islands, and proceed to the Cape of Good Hope via Mauritius, increasing the distance by about 180 miles.

Cape of Good Hope to Mauritius—Full-powered steam vessels.—Direct along shore out of the Agulhas current as far as Algoa Bay, but carefully guarding against indraft and avoiding all salient points. From Algoa Bay, as direct as possible, but keeping about 200 miles from the southern end of Madagascar. Distance, 2,290 miles.

Sailing and low-powered steam vessels.—Make southing and cross the meridian of 20° east in from latitude 39° to 40° south, and then make easting as far as longitude 50° east, edging away to the northeastward and crossing latitude 30° south in about longitude 59° east, and from thence steer direct for Mauritius in the southeast trade wind. Vessels from this direction bound for Port Louis should pass eastward and around the northern end of Mauritius in order to avoid the calms caused by the high land near the southwest extreme of the island.

Return route.—Full-powered steam vessels should pass about 100 miles southward of Madagascar and make the African coast about 200 miles southwestward of Natal, afterwards keeping in the strength of the Agulhas current until abreast of Mossel Bay; from thence steer direct to round Cape Agulhas at a prudent distance.

Low-powered steam and sailing vessels.—The same as with full-power steam vessels except that when nearing the Cape of Good Hope, with strong westerly winds, they should keep on the Agulhas Bank, not more than 40 or 50 miles from the shore, where the water will be smoother than elsewhere.

Natal to Mauritius.—Full-powered steam vessels should take the direct route round the southern end of Madagascar, giving that island a berth of about 100 miles to avoid the strength of the westerly current. Distance, 1,600 miles.

Low-powered steam and sailing vessels.—Stand to the southeastward, making easting in about latitude 35° south, and from about longitude 50° east keep gradually more to the northward crossing the parallel of 30° south in about longitude 58° or 59° east, and then direct through the trade wind to Mauritius.

Return route.—Direct for all vessels, passing about 100 miles southward of Madagascar and making the African coast well northward of Port Natal.

Zanzibar to Mauritius.—Full-powered steam vessels take the direct route at all seasons. Distance, 1,340 miles.

Low-powered steam and sailing vessels—April to October.—Stand to the eastward, regardless of crossing the Equator in so doing, until eastward of the Chagos group, when southing should be made into the trade wind, and then a direct course steered for Mauritius.

November to April.—Make easting with the northeast and northwest monsoons, and cross latitude 10° south, in about longitude 70° east, and from thence steer direct through the trade for Mauritius. Vessels should keep northward of a line drawn from Zanzibar to the Seychelles until in the northwest monsoon.

An alternative route at this latter season is to stand down through the Mozambique Channel, taking advantage of the current on the African coast, and from the southern end of the channel stand southeastward into the westerly winds and make easting southward of the thirty-fifth parallel, recrossing latitude 30° south, in about longitude 58° or 59° east, and then proceeding direct for Mauritius through the trade.

This being the cyclone season, the first route is the safest, as the path of these cyclones is then more easily avoided.

In leaving Zanzibar in either season it is best to run through the lee pass for the time being, and although if bound to the southward during the southwest monsoon this appears to put a vessel a long way to leeward, as a rule nothing is lost by it, for in order to work to the southward an offing of 90 miles must be gained to be clear of the north-going inshore current, and this can be accomplished in a shorter time by running out with a fair wind.

After the necessary easting is made, low-powered steam vessels may use steam until in the southeast trade, between April and October, and also to get into the northwest monsoon, and after losing it to reach the southeast trade, between October and April; the northwest monsoon is sometimes found in about longitude 45° east.

Return route.—Direct for all vessels.

Zanzibar to Seychelles—Full-powered steam vessels.—Direct route at all seasons. Distance 1,000 miles.

Sailing vessels—April to October.—Stand eastward on the starboard tack and, if unable to fetch the islands, continue on past them until able to fetch them on the other tack. About June and July vessels can generally fetch them without tacking.

October to April.—Keep northward of the direct route while working eastward until the northwest monsoon is picked up, which may be expected after passing longitude 45° east, but is very uncertain. Light winds and calms render this generally a tedious passage.

Low-powered steam vessels—April to October.—Steam out of Zanzibar to the southward, and then stand across under sail.

October to April.—Steam out to the northward and through the Pemba Channel; from thence proceed direct.

Return route—Full-powered steam vessels.—Direct.

Sailing vessels—April to October.—Direct, but allowance must be made for the probability of the wind heading and for the strong northerly current to be entered on nearing the African coast. It is best to sight the northern end of Mafia Island and then to pass inshore of Fungu Kizimkazi.

October to April.—Stand to the southwestward, round the southern end of the Amirante Islands, and from that proceed direct.

Low-powered steam vessels—April to October.—As with the sailing route at this season.

October to April.—Direct.

Mozambique to Seychelles—Full-powered steam vessels bound for Mahe, in the Seychelles, take the direct route. Distance, 1,080 miles.

Sailing vessels—April to October.—Direct, keeping as far to windward as possible.

November to March.—Stand over to the coast of Madagascar and work northeastward along that coast until near Cape Amber, then stand northward across the current rounding that point from the eastward, and pass eastward or westward of the Amirante Group, as the wind may permit. This is always a tedious and uncertain passage.

Low-powered steam vessels—April to October.—Direct.

November to March.—Stand across to the Madagascar coast, then northeastward along that coast until near Cape Amber, then northward, using steam through the light winds and calms, and passing eastward of the Amirante Group.

Return rôute—Full-powered steam vessels.—Direct.

Sailing vessels—April to October.—Stand out on the starboard tack until able to weather the southern end of Mahe; then, on the port tack, pass to windward of Alphonse Island and just to leeward of Providence Island; from thence proceed as direct as possible. Toward the end of the season a vessel may even weather the Farquhar Islands.

November to March.—As direct as possible.

Low-powered steam vessels—April to October.—The same as the sailing route.

November to March.—Direct.

Mozambique to Mauritius—Full-powered steam vessels.—Direct as possible round the northern end of Madagascar. Distance, 1,210 miles.

Sailing vessels—April to October.—Work to the southward, keeping in the strength of the current on the African side of the channel as far as Cape Corrientes or even beyond that cape; from thence, stand southeastward and make easting on about the parallel of 30° south until on the meridian of Mauritius, from which proceed direct in the southeast trade. If bound to Port Louis and approaching from the southward, pass eastward of the island and round the northern end, in order to avoid the calms and baffling winds under the high land near its southwestern part.

November to March.—Stand down the African coast, keeping in the strength of the current, and from the southern end of the Mozambique Channel steer southeastward into the westerly winds making easting southward of latitude 35° south and recrossing the parallel of 30° south in about longitude 58° or 59° east, when make direct for Mauritius through the trade wind.

An alternative route, in the event of a southwesterly wind blowing in the Mozambique Channel at the time of leaving port, which sometimes happens during the season of the northeast monsoon, is to stand over to the Madagascar coast, working northeastward along it to near Cape Amber, then keep to the northward to make easting southward of the Amirante and Seychelles Groups until beyond the Saya de Malha Bank; from thence proceed direct for Mauritius. This is generally a slower route than the other and there is more danger of meeting with cyclonic disturbances.

The distance is about the same by both routes, viz, 3,000 miles.

Low-powered steam vessels—April to October.—The same as for sailing vessels.

November to March.—As in the sailing routes, but when taking the southern route using steam in light adverse winds; and when taking the northern route using steam when necessary along the northwestern coast of Madagascar and also to make easting southward of the Amirante and Seychelles Groups.

Return route—Full and low powered steam vessels.—Direct as possible round the northern end of Madagascar.

Sailing vessels—April to October.—Round the southern end of Madagascar, passing up the Mozambique Channel on or about the forty-second meridian and when nearing Port Mozambique edge in for it, making allowance for the strong south-going current when within 60 or 70 miles of the land.

November to April.—Direct as possible round the northern end of Madagascar, passing up the Mozambique Channel on or about when approaching Port Mozambique and making the land northward of that port.

N. B.—Vessels bound to the northwestern coast of Madagascar should always go round the northern end of that island; and those bound to the western coast, or to any ports on the African coast southward of Kiliman round the southern end.

Cape of Good Hope to Straits of Sunda.—Full-powered steam vessels proceed alongshore as far as Algoa Bay, as previously directed, and then follow the great circle route to the Straits of Sunda. This route passes just southward of the Keeling or Cocos

Islands. The distance is about 5,040 miles, but if calling at Mauritius the distance is increased by about 140 miles.

Sailing vessels—April to September.—On leaving the Cape of Good Hope, sailing vessels should stand to the southward and then make their easting in latitude 39° or 40° south keeping between these parallels, then edge away to the northeastward, crossing latitude 30° south in about longitude 100° east, and latitude 20° south in about longitude 150° east, passing close westward of Christmas Island and up to Java Head; but care must be taken to keep well to the eastward, especially in June, July, and August, when the southeast monsoon is at its strongest, or the vessel may fall to leeward of Java Head and find great difficultly in regaining it against wind and current.

From October to April, after passing St. Paul Island, cross latitude 30° south in about longitude 95° east and then steer direct for Sunda Strait, taking care at this season to pass well westward of Java Head, as westerly winds then blow at times with great strength along the southern coast of Java. Should contrary winds be met with after passing St. Paul Island, stand at once to the northward through the southeast trade into the northwest monsoon, and then proceed direct to the Straits of Sunda.

Low-powered steam vessels take the same route as sailing vessels.

Return route—Full-powered steam vessels.—From Sunda Strait follow the rhumb line across the Indian Ocean to make the African coast about 200 miles southwestward of Natal, and then proceed as if from Mauritius.

Low-powered steam, and sailing, vessels—May to October.—From the Straits of Sunda, when fairly in the Indian Ocean, shape course to pass about 100 miles southward of Madagascar and from thence as in the passage from Mauritius.

November to April.—This being the season of the northwest monsoon, vessels from the Straits of Sunda should stand to the southward into the southeast trade and then proceed toward the Cape as before, bearing in mind that this is the cyclone season in the Indian Ocean.

Cape of Good Hope to Australia.—Full-powered steam vessels stand to the southward across the Agulhas Current and then eastward on about the fortieth parallel. If for Swan River, this parallel is left for the great circle, when in longitude 74° east; if for St. George Sound, when in about longitude 85° east; and if for Port Adelaide, when in 106° east. If bound for Melbourne or through Bass Strait, when in about 127° east, proceed direct for and make Moonlight Head, westward of Cape Otway, and then through Bass Strait and along the coast to the destination.

If bound to Hobart, Tasmania, when across the Agulhas Current, follow the rhumb line to the south extreme of Tasmania.

The following route in the South Indian Ocean has been adopted by the steam vessels of the Shaw, Savill & Albion Co., the New Zealand Co., and the White Star Line.

The respective meridians are crossed on the parallels given: Longitude 40° east in latitude 43° 10′ south; longiture 50° east in latitude 44° 50′ south; longitude 60° east in latitude 45° 25′ south; longitude 70° east in latitude 45° 40′ south; longitude 80° east in latitude 45° 55′ south; longitude 90° east in latitude 46° 30′ south; longitude 100° east in latitude 47° 0′ south; longitude 110° east in latitude 46° 45′ south; and longitude 120° east in latitude 46° 20′ south.

The distance from the Cape of Good Hope by these routes is as follows: To Swan River, 4,780 miles; to King George Sound, 4,810 miles; to Port Adelaide, 5,760 miles; to Melbourne, 6,030 miles; to Sydney, 6,550 miles; and to Hobart, 5,960 miles.

Low-powered steam, and sailing, vessels.—Make southing from the Cape of Good Hope as previously described until in latitude 39° or 40° south, and run to the eastward about on these parallels. If bound to Swan River, when in about longitude 100° east proceed direct; if for King George Sound, when in longitude 105° east; if for Port Adelaide, proceed direct for Cape Borda when on the meridian of Cape Leeuwin.

If bound for Port Philip, or to Sydney through Bass Strait, proceed direct for Moonlight Head when in about 135° east.

A higher latitude than 40° south is not recommended on account of the more severe weather, danger of meeting with ice, etc. Many vessels do, however, now follow a more southerly route, going as far to the southward in summer as the fifty-second parallel.

Return route—Full-powered steam vessels.—As direct as possible, keeping northward of latitude 40° south, and even as far as 34° south, the distances all being increased from 100 to 250 miles.

Low-powered steam, and sailing, vessels.—There are two return routes from Melbourne and the southeastern ports of Australia.

The northern route, taken from April to October, when the southeast monsoon connects the southeast trade of the Pacific with the southeast trade of the Indian Ocean, is made either by the inner or the outer route to Torres Strait, low-powered steam vessels always taking the inner route, and from thence through the Arafura Sea into the Indian Ocean; and, if not calling at Mauritius, passing southward of it and of Madagascar, and making the African coast and the Cape of Good Hope as though from Mauritius.

The southern route.—Easterly winds being prevalent on the southern coasts of Australia from December to April, vessels then take the southern route from all the ports mentioned. Those from Sydney should keep in the strength of the south-going current about 15 or 18 miles offshore along the southeastern coast of Australia. From thence, through Bass Strait and direct for Cape Leeuwin, not going southward of latitude 40° south. When round Cape Leeuwin, stand to the northwestward into the southeast trades, and thence run down the trades as in the northern route, but bearing in mind that this is the cyclone season in the Indian Ocean.

Cape of Good Hope to New Zealand—Full-powered steam vessels.—Stand to the southward across the Agulhas Current, and thence steer a fairly direct course for the southern end of New Zealand; then pass between the Snares and South Trap and along the eastern coast of New Zealand for the destination. Distance to Wellington, 7,170 miles.

Low-powered steam, and sailing, vessels.—Proceed as if for Australia until on the meridian of Cape Leeuwin. From thence, in the summer months, southward of Tasmania, but in the winter months pass through Bass Strait. If bound to Auckland, proceed round the northern end of New Zealand; if for Wellington, through Cook Strait; and if for Otago or Lyttelton, southward of New Zealand through Foveaux Strait, or, in thick weather, southward of Stewart Island. The distance from the Cape of Good Hope via Hobart to Auckland is 7,440 miles; to Wellington, 7,220 miles; and to Otago, 6,970 miles.

Return route.—The reverse of the above routes to Tasmania and Australia, and thence to the Cape of Good Hope by the northern or southern route across the Indian Ocean, according to season, as described on the preceding page.

CHAPTER II.

CAPE OF GOOD HOPE TO CAPE AGULHAS.

General remarks.—The description of the coast northwestward of the Cape of Good Hope will be found in Africa Pilot, Part II.

Cape Peninsula.—This remarkable peninsula, extending for a distance of about 28 miles in a south-southwest direction from Table Bay to the Cape of Good Hope, its southern termination, is from 5 to 8 miles in breadth, with heights varying from 3,550 feet at Table Mountain and 3,200 feet at Constantia Berg, to only a few feet above sea level between Chapman Bay, on the west, and Fish Hoek Bay, on the east, this lowland being only visible between certain bearings: the neck of land between Table Bay and False Bay, a distance of about 11 miles, and connecting the peninsula with the mainland, is also low.

The peninsula is generally rocky and barren, with a stunted growth of trees in places, but fertile valleys, in the vicinity of Constantia and Wynberg, are exceptions. From the westward the peninsula presents a high and rugged appearance from Table Bay as far south as Paulsberg, 4 miles northward of Cape Point, and between these latter places the land is high and even, with the exception of two peaks near the southern extreme, which, from a considerable distance, have the appearance of an island in the form of a saddle.

Depths offshore.—A bank, with depths under 20 fathoms, surrounds the Cape of Good Hope, being about 2 miles southwestward of Cape Maclear, the southwest extreme, and fully 2 miles southward and 1½ miles southeastward of Cape Point. Southwest Reefs, consisting of patches of from 4 to 5 fathoms, extend about 1 mile southwestward of Cape Maclear, and near the southern and southeastern edges of this bank, respectively, are Bellows Rock, awash at high water, and Anvil Rock, with less than 1 fathom over it.

Approaching the cape, especially in thick weather or with any doubt of the vessel's correct position, the precaution of using the lead should never be omitted.

Cape of Good Hope.—The southern extreme of the Cape Peninsula, terminates in two points about 1¼ miles apart, Cape Maclear being the western and Cape Point the eastern, the latter forming a high precipitous cliff, surmounted by two peaks, nearly 1 mile from each other in a northwest and southeast direction; Vasco da Gama Peak, 880 feet high, is the northwestern of these, and the southeastern, 800 feet high, near the pitch of Cape Point, has the lighthouse on it.

Light.—From a white iron tower 30 feet in height, on Cape Point, is exhibited, at an elevation of 816 feet above high water, a white revolving light, visible in clear weather 36 miles. For obscured arcs, see Light List.

Caution is necessary when approaching this light, as from its great height above the sea it is frequently obscured by mist, although at the same time it may be clear round the horizon.

Lloyd's signal station.—A Lloyd's signal station, situated on Cape Point close to the lighthouse, is connected with the telegraph system of Cape Colony, and passing vessels communicating by International Code, or showing their numbers, will be duly reported.

Vessels can also communicate through a wireless telegraph station at Slang-kop Point, about 15 miles to the northward of the cape, the station being open to the public at all hours and the call letters "V. N. C."

Dangers.—**Southwest Reefs,** generally breaking, appear to be patches on the outer projection of a rocky ledge, extending 1 mile southwestward from Cape Maclear; the outer patch, of 5 fathoms, is about 2 miles westward of Cape Point. Under no circumstances should vessels attempt to pass inside these patches, and, coming from the northward, Siang-kop Point open of Olifants Bosch Point, bearing 340°, leads about 1¾ miles westward of the outer patch, and the vessel may be kept to the eastward when Cape Point bears 52°.

Bellows Rock, awash at high water, and always breaking, lies a little more than 2 miles southward of Cape Point Lighthouse; the water is deep close round this rock except on its southwestern side, where sunken rocks, on which the sea does not always break, extend about 200 yards.

Anvil Rock, with a depth of 6 feet at low water, springs, lies on the eastern end of a 3-fathom rocky patch about 400 yards in length, and is situated 1¼ miles southeastward of Cape Point; it breaks only at low water with a heavy swell, and the depths close to seaward are from 14 to 18 fathoms. Vasco da Gama Peak open northward of the lighthouse hill, bearing 299°, leads northeastward, and Constantia Berg well in sight, bearing 339° leads eastward of Anvil Rock.

Dias Rock, about 8 feet high, and connected with Cape Point by a sunken reef, has deep water at 400 yards seaward of it, but three pinnacle rocks, with depths of 4½ and 5 fathoms, lying between Dias and Anvil Rocks, render the passage between unavailable for vessels of deep draft, or even for smaller vessels in bad weather.

Rocky Bank.—A bank of rock and coral, nearly 2¼ miles in length in a west-northwest and opposite direction, and about 1 mile in width, with a least depth of 13 fathoms over it, lies about 4½ miles southeastward of Cape Point.

Directions—From the westward.—Vessels approaching the Cape of Good Hope from the westward in clear weather should see Cape Point Light from a distance of about 36 miles, unless within the arc over which it is obscured by Vasco da Gama Peak, and caution is necessary not to continue a course for the light in the obscured arc, especially when making the land at night or in hazy weather. A vessel near the coast at night, and the land not visible, should be kept to the southwestward until the position is ascertained.

As the wind scarcely ever blows from east or northeast, i. e., directly off the peninsula, sailing vessels bound round the Cape of Good Hope should insure a weatherly position to the northward or southward, according to the season of the year, as southeast gales may detain a vessel bound for Simons Bay for some time if the land is made too far to the northward during the summer season.

Rounding the cape from the westward.—Vessels rounding the cape from the westward, and bound into False Bay, should pass about ½ mile southward of Bellows Rock, the breakers on which are always visible, and then steer 63° until Constantia Berg is well in sight bearing 339°, or until Vasco da Gama Peak opens eastward of the 800-foot hill near the cape, bearing 229°, these marks leading eastward and northeastward, respectively, of Anvil Rock.

Vessels bound eastward along the coast, having passed the cape at a prudent distance, should take careful bearings of the Cape of Good Hope Light as long as it is in sight, and make every allowance for a possible easterly onshore set, so as to avoid the dangerous neighborhood of the Birkenhead Rock, bearing in mind also that Cape Agulhas Light is not visible when bearing southward of 95°.

Steam vessels bound into Simons Bay often pass inside the Bellows and Anvil Rocks, but the pinnacle rocks of 4½ and 5 fathoms, already mentioned, make it advisable for large vessels to pass southward and eastward of the Anvil Rock. Vessels taking the inside route, when nearing Cape Maclear, must not bring the Bellows Rock to bear southward of 113° until Dias Rock bears 54°, or until Cape Maclear is midway between Vasco da Gama Peak and a gap which separates the lighthouse from that peak, about 24°, which will lead clear of the southwest reefs; then steer to pass from 300 to 400 yards southward of Dias Rock, or about midway between it and the 4½-fathoms pinnacle rock, lying off it, making due allowance for the scend of the sea according to the state of the weather.

Beaching.—A small sandy cove lies between the lighthouse and Cape Maclear, and in it vessels, in a sinking state, may be beached in greater safety than on any other part of the adjacent coast.

From the eastward.—When Cape Point Light is in sight vessels standing in toward the land should be guided by frequent bearings of it and of Point Danger Light, to avoid the rocks off the latter. When westward of Point Danger, Cape Point Light should not be brought more westerly than 285°, which bearing clears all danger off Point Mudge and Cape Hangklip. As Cape Hangklip and the narrow neck of land connecting it with the shore are very low, great caution is necessary when passing it in hazy weather.

When approaching the Cape of Good Hope, the use of the lead should never be omitted.

False Bay, entered between the Cape of Good Hope and Cape Hangklip, about 16 miles apart, from this extends to the northward about 18 miles, and has several dangers in it, but the middle and eastern sides are clear, though the bottom is foul and generally unfit for anchorage.

The general depth varies from 46 fathoms at its entrance to 20 fathoms about 5 miles from its head, whence it gradually shoals to the breakers, which break in from 4 to 5 fathoms about ½ mile from the beach. Rocky Bank, with a least depth of 13 fathoms, toward the western side of the entrance to the bay, has been mentioned.

Western shore.—Rockland Point is about 7¼ miles north-northeastward of Cape Point, the first 5 miles of this shore of False Bay, being occupied by a long bight in the middle of which is Buffals Bay, known by a white sand patch and two beacons hereafter mentioned.

There are depths of 4 or 5 fathoms near the shore of the bay, and in a northwesterly breeze a vessel may anchor off it in from 8 to 20 fathoms, over sand, if desiring to await a change, when, if in the greater depth, and a southeast gale comes on, a sailing vessels will find room to weigh, cast, and run up to Simons Bays. A fishing establishment and landing place are situated in Buffals Bay.

Between Buffals Bay and Smithwinkle Bay, 3¼ miles farther northward, the shore is backed by four sharp peaks. Off both points of Smithwinkle Bay are rocks, some above water, projecting 600 to 800 yards offshore, Batsata Rock, 8 feet high, being the highest of those off the southern point.

Rockland Point, the most prominent point between Cape Point and Simons Bay, slopes off to a ledge of dry rocks, at 400 yards beyond which to the southeastward is Bakkoven Rock, isolated and 9 feet high, with 11 fathoms close-to. Castle Rock, 600 yards southward of Bakkoven Rock, dries at low water.

At 1½ miles northwestward of Rockland Point is Oatland Point, with a few rocks off it, on one of which stands one of the beacons marking Whittle Rock. Between these points sunken rocks extend from 600 yards to ½ mile offshore.

Whittle Rock, with 1¼ fathoms water, is about 6 feet in diameter and seldom breaks. It lies 26°, distant nearly 7¼ miles from Cape Point and on the southern side of a rocky patch nearly 1 mile in circumference, on which the depths vary from 7 to 10 fathoms.

Beacons.—The position of Whittle Rock is shown by two pairs of beacons, which in line lead over it, the rock being at the intersection of the two lines.

The first pair of beacons is situated at Buffals Bay, the front beacon, with a white staff and ball, standing near the sea on its northern side; the rear beacon, with a black staff and ball, is on a ridge of hills behind the bay. These beacons are in line bearing 233°.

A beacon, 35 feet high and 56 feet above high water, painted white with a red band in the center, stands on a flat-topped rock near Oatland Point and is 1,700 yards from an inner white diamond-shaped beacon, 30 feet in height, on the shoulder of the hill beneath Simonsberg. A large whitewashed patch on a hill northwestward of Simons Town is also in one with these latter beacons, when they are in line bearing 296°.

Clearing marks.—Chapman Peak well open westward of Elsey Peak bearing 315°, leads 800 yards westward of Whittle Rock; and Elsey Peak, in line with Roman Rocks Lighthouse 328°, leads midway between Whittle Rock and Miller Point. Also, if the beacons or either of the respective pairs are kept open of one another, Whittle Rock will be cleared.

West shore.—From Oatland Point the west shore of False Bay trends to the northwestward, for about 1½ miles, to the root of the east breakwater of Simons Bay, and about ¾ mile within it is Simonsberg, 1,850 feet high. The following dangers lie off this coast:

Noahs Ark is a flat-topped rock, in shape resembling a barn, about 100 feet long by 20 feet high, lying 600 yards offshore, and about a mile northward of Oatland Point; a reef extends about 50 yards southeastward of it, beyond which the depths are from 36 to 40 feet.

Maidstone Rock, with 23 feet water, lies 400 yards east-southeastward of Noahs Ark, its base, about 20 feet in diameter, rising to a sharp peak, the summit of which is so small that it is difficult to keep the lead on it. A patch of rocky ground, with a least depth of 50 feet, lies about 150 yards eastward of Maidstone Rock.

Phoenix Shoal.—The 5-fathoms contour line trends northwestward from Noahs Ark for 650 yards, and there turns more westerly toward the angle of the east breakwater, and within it the ground is shallow and foul, with several patches drying from 2 to 5 feet. Phoenix Shoal, about 650 yards northwestward of Noahs Ark, and lying immediately within the 5-fathoms contour line, has a depth of 3 feet near its outer, and patches drying 4 and 5 feet near its inner, part.

Nimrod Rock, with less than 6 feet water, lies nearly midway between Noahs Ark and Phoenix Shoal.

Buoy.—A red buoy, with staff, and the word "Rock" painted on its flag, lies in a depth of about 50 feet 60 yards northeastward from the 3-feet patches of Phoenix shoal.

Roman Rocks, situated 25° distant 1,400 yards from Noahs Ark, and on the south side of a bank under 10 fathoms about ¼ mile in extent, consist of a cluster occupying a space of about 150 yards; the rock on which the lighthouse stands, near the northwestern side of the cluster, is above water, but the rest are awash, and the whole are surrounded by foul ground.

Light.—From a cylindrical iron tower 45 feet in height, with broad red and white bands, standing on the rock above water, is exhibited, at an elevation of 54 feet above high water, a flashing white light visible in clear weather a distance of 12 miles.

Signal station.—Vessels can communicate by the International Code, with a signal station at the lighthouse.

Castor Rock, on the northern side of the same bank, on which are Roman Rocks, and about 400 yards northward of the lighthouse, has a depth of 16 feet; between the rock and the lighthouse there are patches of 18 and 22 feet.

Buoy.—A red buoy with staff, and the word "Rock" painted on its flag, is moored in 11½ fathoms about 120 yards north-northwestward of the rock.

Rambler Rock is a 27-foot patch of small extent, lying ¼ mile southeastward of the eastern end of Roman Rocks.

Seal Island, a low rocky islet, 400 yards long in a north and south direction, and 200 yards wide, lies 6½ miles east-northeastward of Roman Rocks Lighthouse and is surrounded by sunken rocks on which the sea usually breaks. It is the resort of penguins, whose eggs may be collected in considerable numbers at the proper season, but landing is difficult except in very smooth weather.

York Shoal, the nearest part of which lies 1 mile south-southeastward of Seal Island, is a rocky patch about 800 yards in length and 300 yards in width, with depths of from 1 fathom to 4½ fathoms; the sea generally breaks on its northern part, where the depth is less than 2 fathoms.

East Shoal, about ½ mile in length in a north-northeast and opposite direction, and ¼ mile in width, has depths of from 4 to 8 fathoms, except on one small spot near the middle which nearly dries at low water, springs, and on which the sea always breaks; it is situated about 3¼ miles eastward of Seal Island.

Abreast of Gordons Bay, in the northeastern corner of False Bay, is another shoal patch, about 700 yards in diameter, with from 6¼ to 9 fathoms, on which the sea breaks in heavy gales. The shoalest part lies 3¼ miles offshore, and 87° nearly 6 miles from East Shoal.

Simons Bay, about 11 miles northward of Cape Point, and near the northwestern corner of False Bay, is accessible all the year round, and affords perfect shelter, for with heavy southeast gales, the only winds that cause inconvenience, vessels ride safely, and although the bay is exposed to easterly and northeasterly winds, these never blow with any strength.

The west shore, for a distance of nearly 5 miles northward of Simons Bay, ranges in height from 800 to 1,200 feet, and on this shore are four remarkable sand patches, the first of these being on the northwest side of Simons Bay, the second between it and Elsey Peak, the third in Elsey Bay, and the fourth in Fish Hoek Bay.

Between the West Pier, on the east, and, the west shore, the bay is about ½ mile in width, receding about 600 yards, and its southern shore is occupied by the dockyard, with cambers, petties, etc.

The depths across the entrance to the bay are from 30 to 55 feet, shoaling gradually to the 5-fathom contour line, which is about 150 yards from the southern part, and inside which are several detached dangers, some drying a few feet.

Basin.—The basin on the east side of the bay is formed by an East Breakwater and a West Pier, the former extending first for 350 yards 343° from Blockhouse Point, turns 288° for 170 yards, and then 233° for a similar distance, while the West Pier, extending for 350 yards 232°, turns for 140 yards 53° toward the other extreme, leaving an opening between them about 290 feet in width, the basin being dredged to a depth of 30 feet at low water, spring tides.

Lights.—On the northern angle of the east breakwater is a masonry tower, 42 feet in height, from which is exhibited, at an elevation of 56 feet above high water, an occulting light with white and red sectors, visible in clear weather 13 miles. For bearings of sectors which clear Roman and Whittle Rocks, see Light List.

A red fixed light is exhibited, at an elevation of 27 feet, from an iron structure 22 feet in height, situated 14 yards within the head of the East Breakwater, and a green fixed light, shown from a similar structure and at the same elevation, is in the same position within the west pierhead, both lights being visible in clear weather from a distance of 3 miles.

On the end of the town pier, red, green, and white electric lights show red seaward.

Fog signal.—During thick or foggy weather a fog bell at the lighthouse on the north angle of the East Breakwater gives one stroke every 10 seconds.

Naval establishment.—In addition to the basin, which has the dry dock and workshops at its inner part, the dockyard, situated on the southwest side of the bay, has coal stores, a camber dredged to 4 feet, torpedo-boat slips, etc.; the admiral's house with its jetty is on the west side of the bay.

Pier light.—An electric lantern light at the end of the town pier shows red over the bay, and green and white in some other directions.

Wharf Rock—Buoy.—Wharf Rock, with a depth of 9 feet over it, lies about 250 yards eastward of the dockyard camber, and is marked by a red conical buoy.

Port limits.—The area of the dockyard port includes, on the east, so much as is comprised within a line drawn 180° from Phœnix Shoal Buoy to the shore, meeting a line drawn 328° from the same buoy to the south shore of Elsey Bay, and on the northwest, west, and south, the line of high-water mark of spring tides, between the points where the above-defined lines meet the shore, with all bays, creeks, lakes, pools, and rivers, as far as the tide flows.

Directions.—Vessels under steam, or sailing vessels with a fair wind, after clearing Anvil Rock by the directions and clearing marks given, should steer about 356°, midway between Whittle Rock and the western shore, and when Elsey Peak and Roman Rocks Lighthouse are in line, bearing 328°, alter course on that mark until within 1 mile of the lighthouse, when steer to pass midway between it and Noahs Ark.

The red buoy marking Phoenix Shoal can be rounded at a convenient distance and the anchorage steered for, but should that buoy be missing, bearings of the breakwater occulting light will enable the shoal to be avoided.

Sailing vessels with a foul wind and working westward of Whittle Rock will avoid that danger by opening the beacons marking its position of each other, or by keeping Chapman Peak, a dark-colored peak on the south side of Hout Bay, well open westward of Elsey Peak, bearing 315°.

Working eastward of Whittle Rock, Chapman Peak in line with the western edge of the sand in Fish Hoek Bay, about 310°, leads 1,600 yards eastward, and the whitewashed mark on the hill over Simons Bay well open northeastward of Whittle Rock beacon on Oatland Point 291° leads about the same distance northward of Whittle Rock. Bearings of Noahs Ark will clear Maidstone Rock.

The ordinary channel for vessels entering Simons Bay is between Noahs Ark and the Roman Rocks, a width of 1,400 yards; but if the wind be northwest and the vessel under sail, the passage eastward and northward of the Roman and Castor Rocks should be taken, as it affords better working space.

The four sand patches on the hills northward of Simons Bay (the only ones except the patch within Buffals Bay on the whole western side of False Bay) are usually conspicuous and serve as good landmarks for the bay; the western patch is a streak stretching down from the top of the hill.

In thick weather, and being uncertain of the position, a vessel should anchor when in less than 20 fathoms.

By night.—In rounding the Cape of Good Hope care should be taken to give it a berth of not less than 3 miles, and by not going into a less depth than 45 fathoms until the cape light bears westward of 350° a vessel will clear Bellows Rock.

When eastward of Anvil Rock, with Cape Point Light bearing about 298°, distant 3 miles, from near which position the Roman Rocks Light may be seen, steer about 356° until that light bears 328° when alter course for it, passing between the western shore and Whittle Rock, a white sector of occulting light, from the East Breakwater, leading southwestward of that danger.

A red sector of occulting light from the East Breakwater covers Maidstone Rock, Phœnix Shoal, and the dangers between them, and when in the white sector of occulting light, between 265° and 275°, it may be steered for, which leads northward of Phoenix Shoal; and the East Breakwater may then be rounded as convenient.

Passing eastward of Whittle Rock, Cape Point Light should not bear to the southward of 220° until Roman Rocks Light bears about 300° when the vessel can be steered to the northward into the white sector from the East Breakwater light, which also leads southward of York Shoal; a vessel working can make short tacks between the above bearing of Roman Rocks Light and the northern limit of the white sector from East Breakwater Light.

In a southeast gale.—By day, a vessel should run between the Roman Rocks and Noahs Ark, shortening sail so as to have all furled when abreast of the latter, and then round-to under the spanker only, and having the sheet anchor ready.

A sailing vessel should not run for Simons Bay by night in a strong southeast gale, for the gusts of wind are violent, and there is risk in bringing up; it is preferable to stand off and on Cape Point under easy sail until daylight, and then enter.

Leaving Simons Bay.—A sailing vessel bound eastward should leave Simons Bay, if possible, at the commencement of a northwest wind, but if bound westward during the winter season it is better to wait until that wind is nearly over, getting under way when it shifts to west; as it is probable that it will then veer from west, through south, to southeast, and the vessel would soon be in a favorable position for rounding Capt Point.

Moorings.—Eight sets of moorings are available for British naval vessels, all except No. 7 being in depths of over 5 fathoms and No. 1, in a central position, being for the flagship. There are also smaller moorings for gunboats, tugs, and lighters. Those for torpedo boats and lighters are on the west side of the bay.

Anchorage.—Merchant vessels anchor only in the berths assigned to them by the senior naval officer, but a good berth for a large vessel is in about 10 fathoms and ½ mile offshore, with Noahs Ark bearing about 117° and the dockyard clock 226°, mooring with the anchors northwest and southeast, with the best bower in the former direction during winter from May to September, when the prevailing winds are from that quarter, blowing in strong gusts over the hills, and to the southeast during the opposite season, when southeast winds predominate.

Examination anchorage.—The examination anchorage commences about ½ mile eastward of the East Breakwater, the limits of the area being marked on the plan.

For signals to be used by vessels approaching defended ports see Chapter I, page —.

Semaphores.—A semaphore is situated at the admiral's house and another at the dockyard.

Life-saving station.—A rocket apparatus is in charge of the port officer and is worked by the royal garrison artillery.

Compass adjustment.—Vessels desirous of ascertaining the compass deviation will find Sharp Peak a conspicuous mountain northeastward of Hangklip Berg, the bearing of which is 109° from Simons Bay, useful for the purpose, and the peak being distant 21 miles, this bearing is not materially affected by the vessel's position in the bay.

Tides.—It is high water, full and change, at Simons Bay at 2 h. 44 m.; springs rise 5¼ feet; neaps rise 3½ feet.

Winds.—Southeast winds, generally prevalent from October to April, do not, as a rule, continue longer than from five to eight days and are succeeded by variable winds. In Simons Bay, as also in False Bay, generally, these winds frequently blow very hard for a day and part of a night and then abate toward morning, being succeeded by a breeze from west-northwest.

During the season of southeast winds they frequently blow with great strength from south-southeast, making landing in boats disagreeable, and sometimes impracticable.

From April to October northwest winds prevail, with frequent gales from that quarter, accompanied by rain, and although these gales occur occasionally all the year round they are rare during the season of southeast winds; northeast winds are uncommon, and never have any strength.

Southwest winds, commonly known as the kloof winds, are cold, and frequently rainy, and when they are blowing boat sailing in the bay is extremely dangerous, on account of the violent and variable squalls which come down from the hills.

If the barometer, standing at 30.2 or 30.3 inches, falls rapidly to 30 or 29.95 inches a gale from south-southeast almost certainly follows, and should Muizenberg be capped with white cloud it is generally the precursor of a southeast wind, which wind will probably be violent and of long continuance if the Hottentot Holland Range on the east side of False Bay, is simlarly capped; when Simonsberg has a misty cloud on its summit, rain may be expected within an hour or two.

It has been remarked that the Hottentot Holland Range is the first to cover on the approach of a southeast gale, and should Muizenberg not cover it may not blow home to Simons Bay.

Town.—Simons Town, lying at the foot of the hills, at the head of Simons Bay, consists of one long street, and had a population of 9,416 in 1912.

Communication.—A railway runs to Cape Town, a distance of 20 miles, and mails are sent for Europe through that port; there is also telegraphic communication.

Supplies.—There are plentiful supplies of fresh meat, vegetables, and bread, and the water, from a tank in the dockyard, is good. Supplies of any kind not obtainable in Simons Town can be procured from Cape Town, and fish are abundant.

Caution.—A fish about 6 inches in length, its back dark with deep black stripes, and belly white with faint yellow patches, is known as the toadfish; it swims near the surface, is easily taken with a hook and line, and when taken from the water puffs out considerably. Should any portion of this fish be eaten death ensues in a few minutes.

Docks.—The dimensions of the dry docks will be found in Appendix II, as also those of four patent slips.

Repairs.—Moderate repairs to engines and boilers of small horsepower can be undertaken in the dockyard, where are two small steam hammers of 15 and 10 hundredweight. A 50-ton crane is situated on the West Pier, and a 20-ton crane on the East breakwater.

Hospitals.—Two naval hospitals are maintained in the town.

Time signal.—A mast on which is a black and white checkered ball, attached to a lever arm, stands close to Simons Town telegraph office, 63 feet above high water, and 40 feet above ground. The ball is hoisted at five minutes before the signal and falls by electricity from the Cape Observatory at 0 h. 0 m. 0 s. South African Standard Time, corresponding to 10 h. 00 m. 00 s. Greenwich mean time, but the signal is not made on Sundays nor on holidays. When the signal fails in accuracy the ball is kept up about 10 minutes and then lowered.

West shore.—The west shore of False Bay, from Simons Bay, trends northeastward for 2¾ miles, to Fish Hoek Bay, Kalk Bay (pronounced Cork) being about ½ mile farther northeastward; both bays have villages, and the latter, which is a fashionable watering place, has several good hotels.

About 2 miles northeastward of Kalk Bay is Muizenberg, a mountain 1,651 feet high, already referred to, and from Simons Bay the railway skirts the shore, passing through Fish Hoek and Kalk villages, but turning inland to Wynberg at Muizenberg, there being stations at St. James, near Kalk Bay, and at Muizenberg village.

Head of False Bay.—The head of False Bay trends eastward for about 17 miles, turning southeastward on the east side; it is a low sandy beach, with a continuous line of breakers fronting it, and affords no landing, so that under all circumstances it should be avoided.

East shore.—**Cape Hangklip,** the eastern point of entrance to False Bay, is only about 10 feet high, but 1½ miles north-northeastward of it is Hankklip Berg, 1,448 feet high, quoin-shaped, and sometimes known as False Cape; from the southward it makes as an island, and from some directions its western face appears to overhang, hence its name, while a conspicuous sandy patch extends halfway up its southeastern side.

A rock, with less than 1 fathom over it, lies ¾ mile west-northwestward of the cape and about 700 yards offshore, and as a heavy sea always breaks on the cape and some distance outside this rock, vessels should give it a berth of at least 1 mile when passing.

The land is low to the eastward of Cape Hangklip, but then rises, and at 3½ miles eastward is Sharp Peak, 2,780 feet high, which is the commencement of a chain of mountains extending eastward, and has been already mentioned in connection with compass adjustment.

Pringle Bay.—The east shore trends slightly to the westward of north for 2¾ miles from Cape Hangklip, and then turns eastward for 1 mile, forming the south shore of Pringle Bay, which, although open to westerly winds, affords good shelter from southeast gales, in depths of from 9 to 10 fathoms.

Kogel Bay.—From Pringle Bay the coast trends northward with an outward curve, for 4 miles, to the south side of Kogel Bay, and midway is Klein Hangklip, 971 feet high, close within it. Kogel Bay, about 3 miles in width, and receding eastward about 1 mile, is open to the westward, and although affording some shelter from southerly and easterly winds, the bottom being in many parts rocky, it is not a good anchorage.

Gordons Bay.—The coast has a north-northwest trend from Kogel Bay, for about 3 miles, and then turns east-northeastward for nearly a similar distance, forming the south shore of Gordons Bay, which is about 3 miles across its entrance, and recedes eastward about 2 miles; it affords shelter from southerly and easterly winds, but, being fully exposed to westerly winds, vessels can only use it during the summer months.

Mosterts Bay, on the north side of the entrance to Gordons Bay, is a natural boat harbor, formed by a circle of sunken rocks, extending some distance from the shore, and having a narrow entrance, but affording good shelter inside; the fishing village of Strand is on the north shore of this harbor.

South coast.—Point Danger is 27½ miles southeastward of Cape Hangklip, and between, the south coast forms Sandown and Walker Bays, two bights, separated by Point Mudge, lying nearly midway between them; from a line joining Cape Hangklip and Point Danger, Sandown Bay recedes 8¼ and Walker Bay 10 miles. Except on the sandy shores of both bays the coast line consists generally of rocky projecting points, and landing can only be effected in certain places shown on the chart.

Palmiet River, 9¼ miles eastward of Cape Hangklip, is a rapid stream during winter, but its entrance is always blocked by sand; a small sandy cove, about ¾ mile eastward of the river, affords boat landing in fine weather and at high water. Bot River, nearly 5 miles east-southeastward of the cove, has a similarly sand-blocked entrance to that of Palmiet River.

Point Mudge, low and rocky, has several sunken rocks covered with masses of kelp off it, and about 1¾ miles east-northeastward of the point is Onrust Berg, a square bluff, 1,575 feet high, with a pile on it, and forming the termination of a range of coast hills.

The British naval vessel *Birkenheads'* gig landed, after the wreck of that vessel, in a small rocky cove about 1 mile northward of Point Mudge, but there is better and safer landing, with easterly and southeasterly winds, in D'Urban Cove, immediately northward of Point Mudge.

Walker Bay is remarkable for the immense tracts of sand and high sandhills at its head, which are visible from a long distance, and give a distinctive character to this part of the coast, about midway along the sand, and 1 mile inland is a pyramidal sandhill, 427 feet high. A long, heavy swell always rolls into the bay, and the water is deep within 1 mile of the beach.

Klein River, in the northern bight of Walker Bay, is a stream of considerable size inland, but its mouth is choked with sand.

Stanford Cove, a small rocky inlet very similar to D'Urban Cove at Point Mudge, affords landing in easterly and southeasterly winds; it lies in the rocky southern shore of Walker Bay, 5 miles east-northeastward of Point Danger. Several rocky patches off it, which, with the heavy swell, render it less available than Hydra Bay. Some fishermen's huts are situated near the head of the cove, and plenty of good water may be obtained.

Hydra Bay, lying between Stanford Cove and Point Danger, is easily distinguished by a sand patch which marks the face of the hillock over it. Patches of 3 and 3½ fathoms, which do not always break, lie about ½ mile offshore on the edge of the 5-fathom contour line, but, avoiding these, the bay affords the best anchorage, sheltered by Point Danger, as farther in Walker Bay the swell is heavier.

Directions.—Approaching Hydra Bay from the southward, Point Danger Lighthouse should not be approached nearer than 2 or 3 miles, and the bluff hill of Point Mudge may be steered for until the sand patch in Hydra Bay is well open, bearing about 85° when the rocky spit projecting from Point Danger will be cleared.

From this edge in for the bay, anchoring in depths of 12 or 14 fathoms, about 1,400 or 1,600 yards from the shore, taking care to keep the low extreme of Point Danger open of the intermediate points, bearing about 210°, to avoid the patches already mentioned.

Tides.—It is high water, full and change, in this neighborhood, at 2 h. 50 m.; springs rise 5 feet. The establishment and rise of tide from Simons Bay to Cape Agulhas are nearly the same.

Current.—Occasionally a current has been experienced between Capes Hangklip and Agulhas, setting in an east-southeast direction about 1 knot an hour, but the tidal streams are inconsiderable and uncertain.

Point Danger, the southwestern extreme of Walker Bay, is a tongue of low sand hills covered with bushes and stunted trees, projecting about 4½ miles from the base of Duin Fontein Berg, a conspicuous bluff hill, 1,130 feet high, remarkable from every point of view at sea. This long projecting point, as already stated, affords shelter from the southeast gales of summer.

The depths are irregular off Point Danger. It should not be approached at night to a less depth than 35 or 40 fathoms.

Light.—On Point Danger, from an octagonal tower 60 feet in height, with red and white alternate sides, is exhibited, at an elevation of 150 feet above high water, a white group flashing light. In clear weather it should be visible from a distance of 18 miles.

Signal station.—Vessels can communicate by International Code with a signal station situated close to the lighthouse, which is connected by telephone with the stations in the union.

Birkenhead Rock, the most dangerous of several detached sunken rocks met with off this part of the coast, lies about 1 mile from the pitch of Point Danger. It has 2 fathoms water over it and from 10 to 18 fathoms within a short distance all round, and on it the British naval vessel *Birkenhead* was lost with 436 lives in February, 1852. The sea breaks with violence on the rock, but often only at intervals of about a quarter of an hour.

Dyer Island.—Sandy Point is situated about 7½ miles east-northeastward of Point Danger, and from the former, shoal water, on which are islets and numerous rocks, sunken and awash, extends 3½ miles southwestward. Dyer Island, a low rocky islet, visible only at a short distance and frequented by rabbits and numerous sea birds, being the largest. Geyser Island, about ¼ mile southward of Dyer Island, is smaller.

These islets, together with the numerous rocks extending nearly 1½ miles westward from them, form a natural breakwater, under which vessels may find shelter in southerly and southeasterly gales, but landing is not good and is at times impracticable, the best place being near a small shed on Dyer Island.

Directions—Anchorage.—Dyer and Geyser Islets, being low and white, are made out with difficulty when seen against the sand hills on the adjacent coast, so that in approaching from the southward in order to avoid the reef extending westward from them, which does not always break in fine weather, keep Palmiet Valley, a depression in the high land about 8 miles eastward of Cape Hangklip, open of Point Danger, bearing about 320°, until Geyser Island is in line with Gunners Quoin 101°.

From this steer for Duin Fontein Berg, and when Gunners Quoin is open northward of Dyer Island about 110°, alter course for it and anchor in from 10 to 12 fathoms, over sand, and good holding ground, with the extremes of Dyer Island bearing about 128° and 156°, distant 1 mile. The reef affords no shelter from the southwesterly winds.

A narrow channel, with a depth of 2¾ fathoms, lies between the eastern end of Dyer Island and a rock above water northeastward of it, which a small vessel with the knowledge of the locality might take under favorable circumstances, but the sea breaks across it in southernly winds. Foul ground, with heavy breakers, extends from the Sandy Point abreast to within 1 mile of Dyer Island.

Coast.—From Point Danger to Quoin Point, the latter 19 miles southeastward, the coast is low near the sea, and backed by bare rugged hills of moderate height, one of which about halfway between Danger and Quoin Points, and named False Quoin from its shape, is 888 feet high. A long, heavy swell constantly breaks on the shore, which is everywhere inaccessible except in a small cove 2½ miles northward of Quoin Point, where landing is practicable in southeasterly winds.

At about 5½ miles eastward of Point Danger, at the head of a bay, is the mouth of the Uilkraal, a small stream with a broad sand bar at its mouth.

Patches.—About halfway between Dyer Island and Quoin Point, and 1½ miles offshore, are two rocky patches, one on which the least depth found was 4 fathoms; the other patch dries, and the sea breaks on them with any swell.

Quoin Point.—Gunners Quoin, or Buffel Jagt Berg, a conspicuous bluff hill, 997 feet in height, is named from its shape, although when viewed from the westward its resemblance to a quoin disappears. Quoin Point, a mass of square hummocky land projecting from the base of the Gunners Quoin, and 3 miles from it, is fronted by sunken rocks and heavy breakers extending upward of 1 mile from the shore; seen from the southward, it may be known by two sand hills near its extreme.

From Quoin Point to Cape Agulhas the coast, though receding slightly, has a general southeast trend for 19 miles, and is low and sandy, except abreast of Zoet Anys Berg, a flat-topped range, of which the highest part is 870 feet high, where it becomes steep and rocky. The whole of this coast line is exposed to the full force of the ocean swell, and landing is impracticable.

The depths are less along this part of the coast than off and westward of the Gunners Quoin; and between 2 and 4 miles eastward of the southeastern face of Quoin Point, and 1¾ miles offshore, are several rocky patches, some of which are above water.

Directions.—In standing toward any part of this coast, Cape Agulhas Light should not be lost sight of, and a vessel should stand off before the light becomes obscured when bearing 95°. From the westward, having passed Quoin Point at 7 or 8 miles distant, a course about 100° will pass Cape Agulhas at a similar distance; and for possible dangers in a too close approach to this shore.

There is tolerable shelter and smooth water in strong northwesterly winds under the lee of the reefs 4 miles eastward of Quoin Point, and it is possible that a small vessel might find shelter close under the east extreme of Quoin Point. The whole of this coast, however, should be given a wide berth when possible.

Cape Agulhas, a rocky projection forming the extreme southern point of Africa, is distinguished from other points in the locality by the features of the land about it. From a distance seaward, eastward, or westward, the northern and southern elevations or ridges resemble two oblong hummocks, while at a distance from the southward they appear as one; the highest part of the cape, about 1 mile within it, is 455 feet above high water.

Light.—On the first undulation within Cape Agulhas is a cylindrical tower 63 feet in height, with red and white bands, which exhibits at an elevation of 126 feet above high water a white flashing light visible in clear weather from a distance of 18 miles. For arc of visibility, see Light List.

Lloyd's signal station.—A Lloyd's signal station near the lighthouse, with which vessels can communicate by International Code, is connected with the telegraph system of the Union of South Africa.

CHAPTER III.

CAPE AGULHAS TO CAPE RECIFE, ALGOA BAY.

Agulhas Bank.—The limits of this extensive bank, southward of Cape Agulhas, are fairly defined. The 100-fathom contour line, about 5 miles from the Cape of Good Hope, trends south-southeastward, passing about 30 miles from Point Danger and 40 miles from Cape Agulhas, and arriving at a position nearly 120 miles south-southeastward of the latter cape, turns west-northwestward, and passes 60 miles from Cape St. Blaize, 25 miles from Cape St. Francis, and 20 miles from Cape Recife, after which it continues gradually to close the shore.

Nowhere does the edge of the bank appear to be very steep; the general depths on it are from 45 to 80 fathoms, increasing to 100 fathoms and upward at its southern extreme.

Eastward of Cape Agulhas the bottom is generally either rocky or of coarse sand, shells, and small stones, and westward of that cape mud or green sand will be found southward of latitude 35° 15′ south, but in less than 50 fathoms the bottom is rock, sand, or stones, and beyond a depth of 90 fathoms it is generally sandy, with black specks. The quality of the bottom is not, however, sufficiently defined or ascertained to determine a ship's position by it.

One remarkable fact as to the Agulhas Bank is seen in its quieting effect on the heavy seas which roll up to it. A vessel may be laboring heavily in a turbulent and irregular sea while in deep water outside the bank, but directly soundings of from 60 to 70 fathoms are obtained the sea becomes comparatively tranquil.

Coast.—Immediately to the eastward of Cape Agulhas are two small indentations, the first of which is St. Mungo Bay, and the whole coast line about Cape Agulhas and from then to Northumberland Point 3¼ miles eastward of the lighthouse, consists of rugged sandstone and quartz rocks, or rocky reef, extending 600 or 800 yards offshore, and at all times unapproachable by boats.

Exposed to the uninterrupted swell of the Southern Ocean, the sea breaks heavily all along this iron-bound coast, especially during southerly winds, and a vessel, taking the ground on it, has not the slightest chance of escaping destruction.

Reported dangers.—S. S. *Mexican* reported, 1894, that the vessel struck some obstruction off Cape Agulhas about 207°, distant about 1¼ miles from the lighthouse; the depth given on the chart in this position is 6 or 7 fathoms, and the distance outside the coastal line of breakers scarcely ½ mile.

The lighthouse keepers at Agulhas having never seen breakers, it appears much more probable that the obstruction is a wreck. On certain charts, however, "rock hereabouts" is inserted at the spot where the *Mexican* reported having touched.

S. S. *Alcestis* also struck an obstruction off this cape in 1892, the assumed position being 249°, distant 2¾ miles from Cape Agulhas.

Caution.—It may be well here to repeat the caution already given in Chapter I. that off Cape Agulhas and all other parts of the south coast of Africa, but especially off salient points, sunken wrecks or uncharted dangers may exist near the shore; and that it is not advisable to approach this surf-beaten shore, even in full-power steam vessels, within 2 or 3 miles.

When a strong adverse current prevails the temptation is great, but westward of Algoa Bay there is nothing to be gained by so doing, and, in case of a breakdown in the machinery or from any temporary error in the course, a risk is run of total wreck before anything can be done to avoid such a catastrophe. Sailing vessels should keep 7 or 8 miles offshore.

On this coast, with a heavy swell on, the sea breaks in 10 fathoms, and therefore a rock near enough the surface to be dangerous to a vessel would, unless a mere pinnacle, undoubtedly break long before the whole area became a mass of breakers, which occurs in bad weather.

Northumberland Point, 3¼ miles eastward of Cape Agulhas Lighthouse, is low and sandy, but a dangerous ledge of rocks surrounds it, and shallow water extends in an easterly direction about 1 mile from the point. A detached rock, which sometimes breaks, lies rather more than 1 mile eastward of the point, and southwestward of the point the reef stretches off about 700 yards, the sea breaking heavily near it with southeasterly winds.

A bank about 1 mile in extent, with from 7 to 9 fathoms water, lies between 3 and 4 miles southeastward of Northumberland Point, with its northern edge on the parallel and 5¼ miles eastward of Cape Agulhas Lighthouse; the sea breaks heavily on it in bad weather.

Struys Bay, between Northumberland and Struys Points, the latter, 11 miles northeastward, affords shelter with winds between west and northwest, but is wholly unsafe with onshore winds, and should not be approached in any wind from west-southwest, round by south, to east; with such winds the sea breaks in 7 or 8 fathoms, and the bay has been the scene of many wrecks.

From abreast of the houses in the western part of the bay the beach is clean sand to within 2 miles of Struys Point, where flat jagged rocks commence. Behind this sandy beach is a line of sandhills about 100 feet in height, some of which are partly covered with scrub; behind these again is a green covered ridge attaining a height of 200 feet.

Directions—Anchorage.—Vessels from the westward should round Northumberland Point in depths of from 9 to 10 fathoms, at a distance of about 2 miles, to avoid the dangers off it, and when the stone house in the bay, near which is a flagstaff, bears 265° steer northwestward and anchor in 5 fathoms, over sand, with the house bearing 138°, and the extreme of Northumberland Point about 200°. Here the bottom is clean, while closer in it is foul. Large vessels should anchor farther out in about 7 fathoms.

Vessels from the eastward will clear the dangers off Struys Point by keeping Cape Agulhas Light bearing well northward of 243°.

As a general rule, sailing vessels seeking temporary shelter in this bay in a northwesterly gale should put to sea immediately it subsides, for, from blowing hard at northwest, the wind frequently changes in a few hours to southwest or south, and it is then very difficult to work out, in consequence of the heavy sea which very quickly rises.

Landing.—The landing place, a small cove on the northwestern side of Northumberland Point, is sheltered by a shelf of shingle projecting from each extreme of the cove, but nearly filled up with sand, as is the extreme of a wooden jetty.

Water.—There are several wells, but the little water to be obtained by digging in the sand a short distance from and above high-water mark is brackish.

Village.—The village of Bredasdorp, where supplies can be obtained, and where there is posted communication with Cape Town, is 7 or 8 miles inland and 16 miles or three hours' journey from the landing place in Struys Bay.

Honing Nest River, discharging into Struys Bay near the center, between bare sand hills, is the outlet of several streams, of which the principal are the Kars, Poorts, and Nieuw-jaar, flowing for many miles from the hills northward and westward of the bay. Their waters cause lagoons in places in the flat land lying within this coast. The Honing Nest is unimportant and usually fordable ¾ mile from the mouth, and often at the mouth, but the latter is dangerous.

Tides.—It is high water, full and change, in Struys Bay, at 2h. 50 m.; springs rise 5 feet.

Current.—No current was observed in the bay at the time of its examination, and it is possible that any current experienced off the coast will be the effects of more or less distant winds; sets to the westward and northwestward have been reported, the latter reaching a velocity of 1¼ knots, and an east-going current of 1 knot has also been experienced.

Accounts concur in stating that eastward of Cape Agulhas there is often an indraft, which seems to be strongest between January and April, both months inclusive, and a large proportion of the wrecks which have occurred between Capes Agulhas and Infanta have been attributed to it.

Struys Point is a mass of bare sand hills, 190 feet high, sloping southward for nearly 1 mile to low-water mark, where it is rocky.

Beacon.—A stone pyramidal beacon, 34 feet high, red to seaward, and red and white bands on its eastern and western sides, is surmounted by a ball 4 feet in diameter, and stands on Struys Point at about 2 feet above high water, springs.

Dangers.—From Struys Point a chain of detached patches of rock extends in a southeast direction. Outer Blinder, the outer rock, has a depth of 3 fathoms at low water, with from 4 to 6 fathoms close-to, and from 7 to 9 fathoms at a distance of 800 yards.

Bulldog or Saxon Reef, about 600 yards northwestward of Outer Blinder, has 2 fathoms over it, 8 fathoms close-to, and about 4 fathoms between it and Outer Blinder. Between the reefs lying between the Bulldog Reef and Struys Point are boat passages available in fine weather.

In standing toward these dangers, Cape Agulhas Light becomes obscured about 600 yards southward of Outer Blinder Rock.

Marcus Bay.—From Struys Point the coast bends round northeastward for about 5 miles to Hoop Point, forming Marcus Bay, and for 2 miles northeastward of Struys Point the shore is a sandy beach with a fringe of low flat jagged rocks, rendering it unapproachable. It is backed by rocky hills, about 150 feet high, and covered with sand; behind these hills is a range of green-covered hills which drop to the plain behind at from 2 to 3 miles inland.

Marcus Bay has rocky patches in it, but in westerly and northwesterly winds it affords shelter equal to that of Struys Bay. Fishermen live near Marcus Bay, and, in ordinary weather, beach their boats on one of the sandy beaches.

Coast.—Inland of Hoop Point is a triple, isolated peak, which, when seen from the southeastward, resembeles a cove.

Martha Point, about 5 miles northeastward of Hoop Point, is named from a vessel wrecked there; it is the scene of more wrecks than any other part of the south coast of Africa. The coast between Struys and Martha Points is fringed with reefs, with from 4 to 6 fatheoms, on which the sea breaks in heavy weather.

Atlas Reef, eastward of Hoop Point, has 3 fathoms least water, and lies $1\frac{4}{10}$ miles from the shore.

Miles Marton Reef, with 4 fathoms, lies 600 yards from Atlas Reef in the direction of Struys Point; a 5-fathom patch lies 800 yards seaward of the Miles Barton Reef; and two similar patches lie 1 mile and 2 miles, respectively, eastward of the Atlas Reef.

Directions.—Care is necessary in approaching Struys Bay, especially in hazy or foggy weather; for the high land of Cape Agulhas may be invisible, while the sand hills of Struys Bay and the breakers off Northumberland Point are distinctly seen, and at such times it may be somewhat difficult to determine whether the vessel is eastward or westward of Struys Point, because the shore features of Struys Bay are very similar to those of Marcus Bay, but the former may be identified by the house and flagstaff near Northumberland Point; and Struys Point will be known by its beacon.

When eastward of Cape Agulhas, a sailing vessel should not approach the shore nearer than 7 or 8 miles, passing the cape at that distance, for, in the event of it falling calm, the heavy swell which constantly rolls in toward the shore will carry the vessel with it, and anchoring would, probably, be of no avail, owing to the swell and the rocky nature of the bottom.

Vessels, rather than attempt to beat round Cape Agulhas in strong northwesterly winds, will find it safe and profitable to anchor in St. Sebastian, Struys, or Marcus Bays, but should be prepared to weigh at short notice on a shift of wind.

By night, vessels from the westward, after passing Cape Agulhas in accordance with directions already given, should keep the light in sight; it is advisable not to bring it southward of 254°, on which bearing a vessel will pass 3 miles outside the dangers extending from Struys Point.

From the eastward, a bearing of Cape Agulhas Light must not be depended on for passing Struys Point, as in hazy weather, or from other circumstances, combined with the distance from Struys Point, 14 miles, the light may be faint or entirely obscured, and the vessel may get within the line of danger. Under such circumstances the point should not be approached to a less depth than 30 fathoms.

Caution.—In rounding or passing Cape Agulhas either way, care is necessary not to mistake the lights of camp fires for Cape Agulhas Light.

Coast.—From Martha Point the coast forms a long bight 23½ miles in width to a double rocky point close to Cape Infanta, the bight receding 4½ miles northward from a line connecting the two points. At 3 miles beyond Martha Point is a large mass of bare sand hills, a broader sand beach, and less of the flat jagged rocks fringing it; this continues for about 7 miles; then the coast again becomes rocky, the bare sand hills disappear, and the Driefontein Range inclines toward the coast.

At 13 or 14 miles from Martha Point the Driefontein Range forms the coast line, and is intersected by deep watercourses, eastward of which the Potteberg Range, attaining a maximum height of 1,979 feet about 6½ miles inland, slopes gradually down some 16 miles to Cape Infanta.

At 1½ miles from the beach and 4½ miles eastward of Martha Point is the southern end of De Hoop Lake, 4 miles in length, into which the Zout River discharges; the lake is shallow throughout, with brackish water, has no apparent outlet, and varies in depth according to season. A farm is situated on the eastern bank of Zout River.

St. Sebastian Bay.—**Cape Infanta**, the western extreme of St. Sebastian Bay, is a bold, cliffy, rocky point about 24 miles east-northeastward of Martha Point and about 1 mile eastward of the double point previously mentioned, which latter has some remarkable masses of rock about it.

Rock.—A sunken rock, known as the Blinder, the position of which is doubtful, is supposed to lies about 1 mile southward of Cape Infanta; it only breaks during heavy gales.

Landing.—From Cape Infanta the coast turns abruptly to the northward, and at about 1 mile within the cape is the mouth of a deep ravine known as Still Bay, with a beach of large rounded stones; here fishermen can usually launch and beach their boats. This is the only landing place for many miles along the coast, and it can often be used when it is unsafe to cross the bar of Breede River.

St. Sebastian Bluff, 2 miles northward of Cape Infanta, is a bold perpendicular headland, 220 feet in height; a ledge extends 200 yards from the bluff, with a depth of 5 fathoms for 200 yards beyond it. Northward of the bluff the cliffs cease and the land around the mouth of Breede River becomes lower, but is deeply intersected, for ¾ mile from St. Sebastian Bluff.

Anchorage.—There is a good anchorage in St. Sebastian Bay, and the western part affords shelter from all winds except those between east and south. The best berth is in 8 fathoms, over sand, with St. Sebastian Bluff bearing from 176° to 165°, and the high flagstaff on the south bank of the Breede River about 305°.

Breede River falls into the sea in St. Sebastian Bay, through a mouth narrowed by sand banks to 160 yards at low water, while sand banks extend from its northern point about ½ mile offshore.

Within the mouth, for 3 or 4 miles, its navigable channel is intricate and varying; above that it contracts and flows evenly between steep banks. For 48 miles from the mouth the general direction of Breede River is northwesterly, but tortuous; at that distance Buffeljagts River, a stream from the mountains 9 or 10 miles distant, flows into it; beyond this confluence the Breede River flows from the west, passing close to the town of Swellendam.

Depths.—The bar has 12 feet over it at high water, and it is the most important navigable river in this colony; a steam vessel, 11 feet, can cross the bar and lie alongside a jetty, while one drawing 8 feet can ascend to Malagas, 20 miles from its mouth.

Supplies are readily obtained, except water, which has usually to be brought down the river in boats from a distance of 20 miles or less according to the season, though sometimes it is fresh at Port Beaufort.

Directions.—The river should be entered at the last quarter of the flood, and a pilot is always ready and may be taken on board in St. Sebastian Bay. The following directions apply to the year 1865, the date of the survey: Having brought two flagstaffs on the sand hills on the southern bank of the river in line, bearing about 280°, steer for them, which will lead over the bar in about 12 feet at high water springs; after deepening the water, open the inner flagstaff a little to the northward of the outer one, passing close to the rocks on the southern shore, until abreast of the flagstaffs, close to which and on the beach will be seen a house.

Still keeping on the same shore, a little farther in, the narrowest part of the channel will be reached abreast of the spit end, when it turns suddenly to the northward; the breadth is here 160 yards at low water, and a vessel may anchor in safety. From this anchorage to Port Beaufort Jetty the depth varies, and no reliable directions can be given.

Tides.—It is high water, full and change, at Port Beaufort, at 3 h. 8 m.; springs rise 6 feet.

Communication.—Port Beaufort, a small trading settlement on the left bank of Breede River, about 2 miles by the channel from the outer part of the bar, has postal communication with Cape Town.

The railway from Worcester to Mossel Bay connects Swellendam with the general railway system of the Cape Colony, and at a place 61 miles by the river from its mouth the main postal road crosses the river, which, 8 miles farther on, is joined by the River Zondereinde.

Coast.—From Breede River the coast trends eastward for 22 miles to Cape Barracouta and consists of cliff-faced hills ranging from 60 to 200 feet high; about 7½ miles eastward of Breede River is Duivenhoks River, small and marked by a conspicuous sand patch on the western side of its entrance. Four miles inland is Wolfskloof Hill, 744 feet high.

About 2 and 5 miles northwestward of Cape Barracouta there are conspicuous sand patches, and Tromps Kop Hill, 959 feet high, lies 6 miles northward of the cape. From the cape east-northeastward to Kaffir Kuyl Bay the coast is irregular, with several projecting points.

Kaffir Kuyl Bay, about 6 miles east-northeastward of Cape Barracouta, with Leven Point midway between, is open to winds from east-southeast to south by west and is therefore unsafe during the season of southeasterly winds; but in winter, when westerly winds prevail, cargoes may be safely landed or shipped.

The anchorage, sheltered from the southwesterly swell by a reef which projects about ½ mile southward from Morris Point, appears to be clear, with regularly decreasing depths of from 10 to 4 fathoms, over sand and broken shells. The best anchorage is in 6½ fathoms about 700 yards offshore, with Morris Point bearing about 205°.

Kaffir Kuyl River is insignificant and its bar nearly dry at low water. There is a good landing place in fine weather in the rocky cove on the southern side of the river entrance.

Coast.—The coast eastward of Kaffir Kuyl River is a sandy beach for about 2 miles, from whence it rises and trends in an east-southeasterly direction for 12 miles to Izervark Point; it is fringed with reefs, on which the sea breaks. Izervark Point is bold and rocky, with Buffels Kop Hill, 732 feet high, about 1 mile northward of it. Aasvogel Berg, a long mountain range, 1,618 feet high at its highest point near the center, lies 11 miles northward from the point, and may serve to identify it.

Between Izervark Point and Cape Vacca, 10 miles east-northeastward, the coast consists of jagged rocks, on which a heavy sea is constantly beating, and immediately inland the land rises to a height of from 500 to 700 feet and is covered with vegetation. Bull Point, about 3 miles eastward of Izervark Point, is not easily distinguished, being only a slight projection, but at ½ mile westward of it is a sand patch of a reddish color, and southward from the patch and 600 yards offshore are patches of detached reef which uncover at low water and break.

Gouritz River, entering the sea about 5¼ miles eastward of Bull Point, has a sandy beach on the western side of entrance, but the breakers are generally too high to make it available as a landing place. The sea breaks across the mouth of the river, which at the outer part is 1,000 yards wide, but ½ mile within it is only from 10 to 15 yards wide.

Cape Vacca, about 1¼ miles eastward of Gouritz River, is the extreme of a low flat of rock and shingle jutting out from a round hill which rises over the eastern side of entrance to the river. In rough weather the sea breaks at about ½ mile off the cape, where the depth is about 9 fathoms, and from the discoloration of the water and the uneasy ground swell in the vicinity it is more than probable that other foul ground exists there.

Care must be taken in rounding this low cape at night, as it is only just within the range of Cape St. Blaize Light, which is not visible when bearing eastward of 54° or about ½ mile outside Cape Vacca. If the light is not seen, the lead is an excellent guide under all circumstances.

Flesh Bay, between Cape Vacca and Flesh Point, 2¾ miles apart, has a sandy shore, except at the extremes, which are rocky, and about the middle is a bare sand hill, 271 feet high. The bay affords temporary shelter during northwesterly gales, but it can only be used as a landing place in tolerably fine weather. Flesh point, which may be known by a flesh-colored patch of sand, is bold-to on the eastern side.

Fish Bay is the bight between Flesh and Pinnacle Points, a distance of 9 miles; the land at 1 mile inland, rising from 400 to 500 feet in height, is covered with vegetation, and the whole of the shore of the bay is sandy, with occasional patches of rock showing near low water and through the breakers, which are generally high. Pinnacle Point is a well-defined commencement of the rocky cliffs, about 250 feet high, extending 4 miles westward from Cape St. Blaize.

Fish Bay may be used by vessels seeking shelter from northwesterly gales, the best anchorage being in the western corner, in depths of 7 or 8 fathoms, with Flesh Point bearing about 157°, distant 1¼ miles, and the same distance offshore. It is advisable for vessels to put to sea as soon as the gale subsides, for then a heavy southwest swell sets in and causes a dangerous breaking sea.

The best landing is near Flesh Point, in a sandy cove between rocks; in fine weather boats may land in the bight under a farmhouse.

Cape St. Blaize is a bluff about 250 feet high, 4 miles eastward of Pinnacle Point. The extreme point is a tongue of low land, fronted by a reef extending about 300 yards, and just below the bluff of the cape is the Logan Stone, a remarkable whitewashed rock.

Light.—Near the extreme of Cape St. Blaize is a square white tower, 46 feet in height, which exhibits, at an elevation of 240 feet above high water, a white group flashing light; it should be visible in clear weather from a distance of 22 miles. For limit of visibility, see Light List.

Fog signal.—During thick or foggy weather an explosive fog signal gives one report every 10 minutes from the top of the lighttower.

Signal station.—Vessels can communicate by International Code by day, or by Morse, by night, with a signal station close to the lighthouse. The lighthouse is also in telephonic communication with the port office at Aliwal, Mossel Bay.

Life-saving station.—A rocket apparatus is maintained at Cape St. Blaize.

Blinder Rock, with 1½ fathoms, and from 5 to 7 fathoms around, lies 450 yards off the cape; the sea breaks on it at low water and in rough weather.

Vessels proceeding westward from Cape St. Blaize should be careful not to shut in the light, nor should they stand into a less depth than 25 fathoms.

Mossel Bay, between Cape St. Blaize and Little Brak River, is 5½ miles wide, the whole of the western shore being a sandy beach through which runs the Hartenbosch River, and between it and Little Brak River are conspicuous sand hills, which are useful in identifying the bay when coming from the eastward; the mouth of the Little Brak River is a dangerous quicksand. At 600 yards from the head of the bay is Seal Island, about 15 feet high, with from 3 to 5 fathoms between it and the shore.

Depths.—The depths across the middle of the entrance to the bay are from 11 to 15 fathoms, the 10-fathom contour line being about 1¼ miles from the southwest and ¾ mile from the northwest shore of the bay.

Mossel Bay Harbor.—The southern shore of the bay for 3 miles northwestward of Cape St. Blaize, is rocky, with the exception of three sandy coves, of which the two outer are named Vaarkens Cove and Munroe Bay, and from the south shore of Vaarkens Cove a reinforced concrete jetty extends 334° for a distance of 500 feet, the railway station being conveniently situated at the root of the jetty. This jetty has all appliances for dealing with cargo and passengers.

On the east side, where land has been reclaimed, is a substantial stone wharf, from the extremity of which extends a breakwater 320 feet in length, which it is intended to lengthen for a farther distance of 680 feet, and on the east side of the wharf is a jetty; rails from the warehouses connected with the main railway run on the wharf, and there are cranes, the largest lifting 10 tons.

A sea wall, curving round the south side of this space, has a jetty extending about 16° for nearly 400 feet from it.

Light.—From a small wooden house on the new jetty head a flashing light every 5 seconds, with red and green sectors, is exhibited, and should be visible from a distance of 8 miles in clear weather; it shows red to the eastward and green to the westward. For bearings of sectors see Light List.

Beacons.—A beacon, surmounted by a diamond, formed of alternate black and white battens, stands on a hill to the southward of the town, and another beacon, with a black diamond as a topmark, is about 50 yards to the northward of the preceding. These beacons in line and in one with the port office flagstaff, bearing about 174°, indicate the best line for anchoring.

Tugs.—Three steam tugs are available.

Directions.—Approaching Mossel Bay from the westward, the lighthouse bluff of Cape St. Blaize is conspicuous, the land at the back being quoin shaped. In rounding the cape keep Pinnacle Point open southward of the rock under the cliffs just westward of the lighthouse bluff, bearing 255°, until the large sand patch near Hartenbosch River bears 339°, when the anchorage may be steered for, allowing sufficient room for rounding-to, if necessary.

Coming from the eastward Cape St. Blaize may be identified by the lighthouse, which, being white, shows conspicuously against the dark background; also by the remarkable sand patch at the mouth of the Hartenbosch River.

Anchorage.—The best anchorage for steamers in Mossel Bay is abreast of the town of Aliwal, in from 6 to 8 fathoms, according to draft of water and state of the sea, with the beacons in line bearing 174°, these depths being found at from 1,200 yards to 1 mile from the jetty at low water.

By night, anchor after the pierhead light changes from red to green, which it does when bearing 176°. Sailing vessels should anchor on the same bearings, but father out, in from 6 to 8 fathoms. All vessels arriving at the port between sunrise and sunset are met by the harbor master, and by him taken to a safe anchorage.

Vessels seeking shelter only should not go within a depth of 8 fathoms at any season.

A vessel parting cables, with no hope of getting to sea, should run for the bight southward of Seal Island.

Port regulations.—A copy of the port regulations will be supplied to every vessel on arrival, and it is obligatory on the master to observe these.

Signals.—Vessels can communicate with the port office by International Code, and the following general signals may be made from the port office when bad weather is expected, and should be obeyed without delay:

11. Union Jack over S: Prepare for bad weather.
12. Union Jack over J: Veer cable.
13. Union Jack over black ball with J below: Veer to whole cable.
14. Union Jack over H: Down top-gallant masts, point yards to wind, see all clear for working ship.
15. Union Jack over M: Strike lower yards and topmasts.
16. Union Jack over B: Hoist a light during the night.
17. Union Jack over R: Heave in cable to same scope as when first moored.
18. Union Jack over black ball: Clear hawse.

These signals may also be made from the port office at night by showing the numbers prefixed to them in transparent figures. The answer is a light at the peak.

The following signals may be made to a stranded vessel from the most convenient point (by day, by means of white figures on a black board; by night, by means of transparent figures):

1. You are earnestly requested to remain on board. There is no danger to life.
2. Send a line on shore by any means at hand.
3. Haul off the whip, make the tail of the block fast to the lower mast or other best place, cast off the line, see that the rope in the block runs free, then wave a flag by day or a light at night.
4. Haul off or look out for the hawser, make it fast about 18 inches above the tail block, see all clear, and signal as before.

NOTE.—A steady light will mean "Avast," a waving light "Go on." Similarly, the shore signal will be made by a red flag by day and by a red light at night.

Life-saving station.—A rocket apparatus is maintained.

Tides.—It is high water, full and change, at 3 h. 30 m.; the rise from 6½ feet. There is no regular stream of tide in Mossel Bay.

Winds.—Mossel Bay affords excellent shelter to vessels during the winter months, April to September, when heavy northwesterly gales are of frequent occurrence, and it is better to take shelter here than to struggle against the heavy seas near Cape Agulhas, as during the strength of these gales the water in the bay is smooth, and vessels ride easily, but it sometimes happens that a heavy southwesterly swell sets into the bay if the wind veers to west and west-southwest, rendering the anchorage unsafe and landing difficult, and at times almost impracticable, and under such conditions a vessel should not anchor in less than 8 fathoms.

In winter, southeast winds are infrequent, moderate, and of short duration. The heaviest gales during the year are from west-northwest, those during winter commencing from north-northwest, with heavy gusts, unsteady both in direction and force, and then veering to west-northwest or west. They blow very hard in continuous gales, with the barometer standing at about 29.6, the wind finally shifting rather suddenly to southwest when they subside with steady breezes and occasional showers.

During the summer season, September to April, moderate southwest winds are very common, but it is the season when southeast gales may be expected, and when they occur the bay is exposed to the full effect of the open sea; these gales, however, commence gradually, seldom last longer than 36 hours, and do not blow home.

A heavy breaking sea rolls in, and vessels usually ride safely with a long scope of cable, with a coir or hempen spring to east the strain, which is also lessened by a strong easterly current or undertow; the holding ground is good. Should a sailing vessel not wish to risk riding out a southeast gale, it would be advisable to put to sea as soon as possible, and clear Cape St. Blaize by first making a long board to the eastward, assisted by the undertow.

Barometer.—It has been found that a low barometer fortells a westerly wind which commences soon after the first rise; a high barometer, on the other hand, foretells an easterly wind, which begins with the first fall. This law applies even in the finest weather, the strength and severity of the gale which may ensue being in accordance with the extent of rise or fall, and the oscillations of the barometer.

Town.—The town of Aliwal, commonly known as Mossel Bay, is situated on rising ground on the southern side of Vaarkens Cove, and consists of numerous well-built houses, an Anglican Church, and a Dutch Church; from its position it is the natural port for the central divisions of the colony, and in 1912 the population was 11,682.

The civil establishment consists of a resident magistrate, a collector of customs, a district surgeon, and a harbor master.

Communication.—Mail steamers of the Union Castle Line, between Port Natal and England, call weekly, and the intermediate steamers, outward bound, call fortnightly.

It is connected with the western system of railways, via Riversdale, Swellendam, and Worcester, from which latter it is distant 209 miles; also with the midland system, via Georgetown, Oudtshoorn, and Klipplaat Junction; it has telegraphic communication.

A road to the interior passes through Robinson Pass and Meirings Poort.

Coal and supplies.—About 300 tons of Natal coal are kept in stock and about 15,500 imported annually; coaling is carried on by bags, and about 400 tons can be put aboard in 24 hours, but southeast and northwest gales may interfere with coaling. There are 14 lighters holding from 40 to 150 tons, and a coal wharf, 120 feet in length, has a depth of 6 feet alongside.

Fresh meat, vegetables, and bread may be obtained, and the water, from the municipal waterworks, is pumped on board vessels from lighters or from a pipe at the jetty head.

Tug.—A tug, belonging to the port, is furnished with a 6-inch salvage pump and fire appliances.

Trade.—The principal exports of wool, skins, aloes, ostrich feathers, tobacco, cereals, and brandy were valued at about $2,921,430 in 1912, and the imports of general merchandise at about $6,112,000; in the same year the port was visited by 252 steam vessels, of an aggregate tonnage of 1,393,859 tons. Aliwal is a whaling station and the center of a large fishing industry.

Coast.—Great Brak River, in the northeastern part of Mossel Bay, about 8½ miles from Cape St. Blaize, enters the sea between sandy hillocks from 80 to 150 feet high, which are mostly covered with scant bush; the beach is sandy and fringed with low water rocks.

About 3 miles farther eastward the sandy hillocks disappear, and the coast becomes shelving and cliffy to the mouth of Mal Gat River, a stream the entrance to which is between high cliffs, its mouth being frequently closed with sand; the water in the river is good, but of a dark red color. A little westward of the mouth and 1 mile from the shore there is a 10-fathom patch, with deep water around.

Brak Fontein, 714 feet high and about 2 miles eastward of Mal Gat River, slopes gradually to the rocky unapproachable shore, and 1¼ miles eastward of the river mouth is a conspicuous cluster of rocks, all within 300 yards of the shore. Dutton Cove, a slight indentation in which lies a rocky islet, is situated about 4 miles eastward of Mal Gat River; it is used for shipping local produce.

Gayang River, close eastward of Dutton Cove, is often closed at its mouth; the water in it is good, but of the same dark color as that of Mal Gat. Great Brak, Mal Gat, and Gayang Rivers take their rise in the Outeniqua range of mountains, which are from 4,000 to 5,000 feet high and situated upward of 10 miles from the coast; these rivers have formed deep channels for themselves across the high plateau extending to the sea coast.

From Gayang River the rocky and unapproachable coast has a general easterly trend for about 7½ miles to Cayman River, and between are Schaapkop and Mill Rivers, the latter flowing between steep and wooded hills into Christina Bay, which has a beach covered with large smooth stones, and does not afford landing.

Victoria Bay, ½ mile northeastward of Christina Bay, is shallow, but broader than it; it has a sandy beach, where landing may at times be effected, but no craft should attempt to enter the bay. Georgetown, standing on a plain behind the coast hills, is about 5 miles from Victoria Bay.

Cayman River, entering the sea about 1 mile northeastward of Victoria Bay, is, like the others, of no navigable importance; where the Zwart River join it, within 1 mile from its mouth, the river is fordable. The Touw River, a small stream rising in the Outeniqua Mountains, discharges a little more than 1 mile eastward of Cayman River, its mouth being often closed by sand.

From the mouth of Touw River the coast trends eastward for about 21 miles to Walker Point, and for nearly 2 miles eastward from Touw River the beach is sandy, with scattered flat rocks appearing at low water, backed by a ridge of irregular sand hills, nearly 250 feet high. From thence the hillocks are stony, but the sandy beach continues with fewer rocks above low water for 4½ miles, when it becomes permanently rocky and the hills increase in height to 300 feet. From thence to Gericke Point, about 2 miles farther, are cliffs of a reddish color, averaging 500 feet in height; the coast here is not wooded.

Gericke Point, about 10 miles southeastward of Touw River, shelters a small bay with an apparently foul bottom; a rocky islet lies off Gericke Point, and rocks extend outside the islet, but all that uncover are within ½ mile of it.

The rocky coast continues beyond Gericke Point for ¾ mile, when the sandy beach again appears for a short space, across or through which the so-called Zwart River drains into the sea at certain seasons, but its mouth is said to be always closed by sand.

Lakes.—Behind the coast, from the mouth of Touw River to that of the Zwart River, a distance of 11 miles, and at distances varying from 500 yards to 3 miles, are Lang Vlei, Rond Vlei, Zwart Vlei, and Groen Vlei, four lakes, on all of which wild fowl abound.

The land at the back of the lakes rises to heights of 700 and 800 feet, and is fertile; although not wooded, there are many conspicuous small clumps scattered about, and it is deeply intersected by streams, rendering the roads steep and bad.

Coast.—From the barred mouth of the Zwart River, conspicuous bare white sand extends east-southeastward for 1 mile, and the beach then becomes rocky, interspersed with patches of sand, and continues so for 5 miles; this beach is backed by irregular hillocks from 200 to 300 feet high.

The land behind Groen Vlei rises somewhat abruptly, and at 3 miles from the sea is 1,110 feet high, presenting a smooth green appearance, with scattered clumps of trees, the valleys being partially cultivated.

In bad weather this coast is fronted for 1 mile or more by heavy detached breakers.

Goukamma River, entering the sea nearly 10 miles east-southeastward of Gericke Point, at the eastern extreme of a sandy beach 2 miles in extent, is remarkable for the suddenness with which it rises after rains, and the depth of water it then attains. At 4 miles, by its course from the sea, it is crossed, on the high road between Georgetown and the Knysna River, by a causeway sometimes dry, and at others covered to a depth of from 12 to 20 feet with a rushing torrent. The river has an average width of 100 yards for these 4 miles of its course, and its mouth is completely closed by sand for long intervals during the dry season.

Walker Point, 2¼ miles southeastward of Goukamma River, is the eastern of two dangerous rocky points, including between them a small rocky and sandy bay 1 mile wide; off the western point, at ¼ and ¾ mile offshore, are rocky patches on which the sea constantly breaks, and the whole neighborhood is foul.

The land adjacent consists of sparsely covered hillocks backed by undulating ridges, but at 2 miles inland treeless, green-colored land is reached, rising to upward of 900 feet in height.

Walker Point, which forms the western horn of Buffalo Bay, has a chain of rocks extending about 700 yards, outside which and lying nearly ½ mile from the point is a sunken rock; but the sea breaks some distance farther out.

Obstruction reported.—The steamer *Clara* reports having observed broken water about 7.5 miles westward of Walker Point in (approximately) latitude 34° 06′ south, longitude 22° 50′ east. The Norwegian bark *Seier* struck a submerged obstruction in this vicinity.

Buffalo Bay, which has not been examined, is included between Walker Point and the rocky cliffs westward of the head at the entrance to the Knysna River, the distance across being about 3 miles. Coasters find sheltered anchorage during northwest winds about ½ mile within Walker Point in the northwest bight of the bay and about the same distance offshore in depths of from 5 to 8 fathoms over blue clay; nearer the point the ground is rocky. With the wind anything to the southward of west, a vessel should put to sea immediately, as a breaking sea then sets in.

Knysna Harbor is immediately eastward of Buffalo Bay and within the entrance to Knysna River, which is formed by two steep and rocky headlands, the eastern having a flagstaff and the pilot rocket stations on it and the western headland rising to 692 feet in West Head Station; the entrance is about 250 yards wide between Needles Point on the west and the dangers off the east side of the entrance.

About 10 miles to the northward of the entrance is Spitzkop Mountain, 3,048 feet high, eastward of which are five paps, and at 9 miles eastward of the entrance and near the coast is Krantz Hoek, 914 feet high, fronted by a bluff 554 feet high, from which the coast slopes away to Cape Seal, the western point of Plettenberg Bay, these all forming good landmarks by which to identify the locality.

On the western side the river for a distance of about 2 miles is formed by a high peninsula about 1 mile in width, and stretching southeastward but within this are mud flats covered in places with grass and weeds and having channels through them, while within the high entrance on the eastern side are Steinbok and Paarden Islands, low, covered with bush and grass, and having channels between them, the town of Knysna being immediately within Paarden Island. Ship Head is about 200 yards within Needles Point on the west, and Outer and Inner Obelisk Points, about 400 yards apart, are on the east side within the entrance.

Dangers.—Black rocks, on which the sea always breaks, form a cluster extending about 200 yards from the western point of entrance, and 800 yards eastward of them is the Mewstone, about 150 yards off the eastern point. Southeast Rocks form a cluster about 800 yards southeastward of the Mewstone.

Emu Rock, with a depth of 4 feet, and on which the sea does not always break, lies on the inner bar about 200 yards southwestward of Inner Obelisk Point.

Bar—Depths.—The 3-fathom contour line crosses the entrance from Needles Point to the Mewstone, and within this contour is the bar, about ¼ mile in width with a depth of 18 feet on its outer and 13 feet on its inner part, which latter lies between Ship Head and Emu Rock; the bottom is sand and mud, but it is probable that this only overlies rock, and the sea breaks on it in bad weather, also with the outgoing stream and a southerly wind, even approaching a calm.

Within the bar the river deepens to 51 feet, the general depths being from 15 to 30 feet abreast of Steinbok Island, but the width of the anchoring space is only about 450 yards, being reduced by a sand bank off the west side of that island; off Knysna, about 3 miles within the bar, the depths are from 10 to 26 feet, and vessels that can cross the bar can proceed to this anchorage, while boats can ascend the river to Westerford farm, a distance of 9 miles.

Beacons.—Two leading beacons are for use in crossing the bar; the front beacon, situated on Fountain Point, about 300 yards north-northeastward of Inner Obelisk Point, is a white stone beacon, on a large rock, and 30 feet above high-water mark.

The inner beacon, on Steinbok Island, is a wooden spar with two red triangles on it, and the beacons are 758 yards apart, and in line bearing 5°.

A gray stone beacon is situated in Best Cove, on the west side of the anchorage abreast of Steinbok Island.

Pilot station.—A white pilot house, which can be seen from a considerable distance seaward, and forms a good landmark, is situated on the summit of Outer Obelisk Point, and from it signals regarding the pilot and the state of the bar will be made to vessels, but although the weather and the bar may both be favorable for vessels to enter or leave the port, it frequently happens that it may not be safe for the pilot boat to go out.

Pilot signals.—The pilot signals used are as follows:

1. White and blue diagonal flag: Pilot boat is coming out.
2. Yellow flag: Pilot boat can not go out, but is ready to receive the vessel within the bar.
3. Black ball at the gaff: Bar is passable; vessels can enter.
4. Black ball halfway up: Caution is necessary.
5. Blue pendant with white center at the masthead: Bar is impassable.

6. A white square flag, hoisted near the signal station: No fishing nor pleasure boats are allowed to cross the bar.

Life-saving station.—At the pilot signal station is a rocket apparatus, which is in charge of the port officer.

Directions.—The harbor is by no means easy of access, even to small steam vessels, owing to the heavy surf across the entrance, and for sailing vessels it is practicable only with a fair wind. The services of a pilot, although desirable for a stranger, are not absolutely necessary except for a vessel proceeding above Best Cove, as that part of the channel is subject to change.

The best time to enter is a little before high water, and it is not advisable either to enter or leave during the strength of the outgoing stream at spring tides, especially should there be any break on the bar. The entrance should be approached with the beacons in line, bearing 5°, steering on this line until nearly abreast of Inner Obelisk Point, when steer to pass about 50 yards off Fountain Point, from which cross the river to Green Point, passing close to it to avoid a sandy tongue extending southward from Steinbok Island, the extreme of which, with a depth of 11 feet, is only about 100 yards from Green Point.

A sailing vessel entering should have the wind at least two points to the southward of west and not eastward of southeast, and a boat should be in readiness with a kedge and hawser, as the wind sometimes dies away between the heads.

A vessel proceeding above Best Cove should be in charge of a pilot; the deep water between Best Cove and Knysna is first on the western and then on the eastern shore.

Leaving the harbor in a sailing vessel, the wind should not be westward of north, nor eastward of east-northeast, the best time for leaving being near high water, although with a commanding breeze, a vessel might go out just before low water, but care is necessary not to close the eastern shore, as the outgoing stream sets toward the rocks between Fountain and Inner Obelisk Points. Frequently there is no wind in Best Cove, although a fine breeze is blowing out through the entrance, and during the summer months, when southeast winds prevail, the early morning is almost the only time for a sailing vessel to leave, as there is then generally a land wind, which dies away about 9 or 10 a. m., and is succeeded by a sea breeze.

Anchorages.—Although in moderate weather a sailing vessel, waiting for wind or tide to enter the river, may anchor off the entrance in from 12 to 15 fathoms water, over blue clay, it is recommended rather to stand off and on until the bar is passable, and if possible a pilot obtained, especially as in unsettled weather the sea frequently sets in heavily from southwest, with little or no wind or warning.

The anchorage in Best Cove is in a depth of 24 feet; the depth close to the shore there is 14 feet. There is no danger in grounding in any part of the river, as the bottom is soft.

Jetties.—Two jetties extend in a direction about 270° at the anchorage near Knysna; the southern, or new jetty, from the west side of Paarden Island, is the continuation of a causeway which connects that island with the shore northward of it; a railway running from the pier and on this causeway, for a distance of 19 miles to the northward into the forest, is used for the transport of timber. This jetty has depths of from 19 to 20 feet alongside, but has been reported to be in a weak condition, although this would scarcely appear to be the case, as a number of steam vessels lie alongside it in safety.

The town jetty, nearly 400 yards northward of the new jetty, extends in a similar direction from the southwest side of the town, and has depths of from 12 to 13 feet at its extremity, but it is not used.

Tides.—It is high water, full and change, in Knysna Harbor at 3h. 30m.; springs rise 6½ feet.

Tidal streams.—The ingoing stream, setting strongly from the southeastward toward Needles Point, thence runs directly through the narrows, but the outgoing stream, from abreast Green Point, sets directly toward Fountain Point, and the rocks between that point and Inner Obelisk Point, and then follows the channel, but bearing to the eastward unless there is a strong west-going current outside, in which case it sets directly seaward.

With a heavy sea on the bar, near high and low water, the force of the break drives large quantities of water toward Emu Rock, this setting strongly out again close to the western shore, outside the inner bar. It is therefore advisable, before taking the bar with a breaking sea, that the ingoing stream should have made at least two hours, at which time the stream and the break act together, and the drawback is not felt.

Town.—The town of Knysna, about 3 miles from the entrance, is divided into Newhaven on the eastern and Belvidere on the western side of the river; it is built on the slope of a hill, and on its outskirts are several villa residences.

Communication.—A weekly service of steam vessels runs from Knysna to Cape Town and to Port Elizabeth.

Avontuur, the terminus of a branch railway from Port Elizabeth, is the nearest railway station, about 30 miles by road, and Georgetown, about 50 miles to the westward by road, is a station on the line to Mossel Bay and Cape Town.

Coal and supplies.—Large deposits of lignite have been discovered in the forest, but no coal is obtainable.

Beef is scarce, but mutton and oysters are plentiful; and the country around abounds in game, while the river produces quantities of fish. Water can only be produced in small quantity.

Good timber is plentiful, and several firms of engineers and carpenters could undertake repairs to small wooden vessels which can be hove down.

Trade.—In 1912 the exports were valued at $24,440 and the imports at about $130,325.

Climate.—The climate, which is extremely healthy, is especially adapted to Europeans.

Coast.—From the entrance to the Knysna River the coast trends eastward for 3 miles to the Nutze River, small, unimportant, and known 3 miles inland as Witte Els. It flows into the sea across a small patch of sandy beach from between high, wooded hills, its mouth often entirely closed.

The coast consists of irregular red cliffs, from 200 to 300 feet high, with patches of shingle beach and points fringed with off-lying rocks to a distance of ½ mile in places. The land behind rises steeply to a height of over 700 feet, and toward the Nutze River clusters of trees become more frequent and larger.

Between Nutze River and Cape Seal, a distance of 14½ miles, are many peaked masses of rock, some bare, others clothed with vegetation, occasionally rising as high as the cliffs and giving a characteristic appearance to this part of the coast, which maintains its precipitous cliffy character for 3 miles eastward of Nutze River, rising steeply behind to a height of 900 feet. This portion and for 3 miles inland is inaccessible, being completely covered to the cliff heads with dense forest, and there is apparently no landing.

At 4 miles eastward of Nutze River a deep gorge is reached, beyond which the country facing the sea assumes the usual smooth, green appearance, with scattered clusters of trees.

Cape Seal, the easternmost point of a tongue of land 2 miles in length, with rugged sides and overhanging cliffs, is clothed with scrubby bush. It rises about its center to a height of 485 feet and is joined to the mainland by a narrow neck. Its peculiar formation gives it from many points of view the appearance of an island. Off its southern side is a rocky mass about ¼ mile in length, 123 feet in height, and joined to it by a narrow sandy isthmus.

Whale Rock, with 4 feet water over it, and on which the sea does not always break, lies about 750 yards southeastward from low-water mark of the cape. A patch of 3½ fathoms lies nearly 200 yards northwestward of the rock, but on the seaward side it is steep-to.

Plettenberg Bay, between Cape Seal and Komkromma Point, the latter about 9 miles northeastward, recedes from that line about 3¾ miles to the northwestward, and from its suitable depth at a short distance from the shore, its good holding ground, and the shelter afforded constitutes about as good an anchorage as any other bay on the south coast.

Vessels may obtain shelter here when the sea is too high for either Knysna River or Mossel Bay, but, like other bays on this coast, it is exposed to the full force of southeast gales, which blow violently and frequently from September to March; a vessel should always be prepared to quit this anchorage on any indication of one of these gales.

Directions.—There are no dangers in entering or leaving the bay except Whale Rock, which should be given a berth of about 1 mile, as there would be considerable risk in attempting the channel between it and Cape Seal. The southern end of the long sandy beach southward of Pisang River open northeastward of the peninsula, bearing about 280°, leads northward of the rock.

Anchorage.—The usual anchorage for vessels loading timber is about ½ mile southeastward of the ledge of rocks off Pisang River, but vessels seeking shelter from westerly gales should anchor more to the southward in a depth of about 8 fathoms, over sand, with the gap in the peninsula bearing 198°, and the extreme of Cape Seal 134°. There is generally too much surf on the beach for landing.

Tides.—It is high water, full and change, at Plettenberg Bay at 3 h. 10 m.; spring rise about 6 feet. There is no regular tidal stream in the bay.

Pisang River, the entrance to which lies 3¼ miles north-northwestward of Cape Seal, is small, and frequently has its mouth closed; at its entrance is a rocky islet, 40 feet high, sparsely covered with bush. Remains of buildings once the property of the East India Co. are still standing, but any trade has been transferred to Knysna, and the bay is seldom visited.

Landing.—A rocky ledge, covered at high water, springs, lying about ¼ mile eastward of the 40-feet inlet, affords some shelter to the beach close northward of it, forming the only landing place, although it is not always practicable.

Communication.—There is telegraphic communication with Cape Town, and a mail cart goes to Knysna twice a week.

Supplies, etc.—Numerous farms are scattered over the country and in the valley of Pisang River, and from them supplies of meat and vegetables can be obtained. The river affords a supply of fresh water, but it generally has to be rafted through the surf in casks.

Coast—Rivers.—Keurbooms River, the most considerable on this part of the coast, rises in the Lange Kloof Range, which attains a height of 5,294 feet, and then runs between high land until within

3½ miles to its mouth, when it flows across a plain in a varying channel, obstructed by sand banks and in many places fordable at low water.

For the last 2 miles its course is parallel with the coast, separated from the sea by a narrow sandstrip, and such an area covers and uncovers with the tide, that at high water it appears to be a large river. It is navigable for boats for about 8 miles, but the bar is only passable under favorable circumstances.

Bitau River, a small stream moving sluggishly and winding along a broad plain from the northwestward, joins the Keurbooms River about 2 miles from the mouth of the latter, and is fordable just above the junction.

From the Keurbooms River, the coast for 5 miles is a sandy beach backed by sand hills more or less covered with scant bush, and along this beach no landing should be attempted, as the sea always breaks heavily. At its eastern end is the Drooge River, mostly dry, as its name implies, from whence the coast becomes rocky with intermediate sandy beaches, the whole being fronted by outlying rocks.

Matjies River, 1 mile eastward of Drooge River, and frequently closed at its mouth, enters the sea from between high hills, and is bounded between high precipitous and wooded hills for some distance from its entrance.

From Matjies River, the coast, trending in an east-southeast direction for 3 miles to Komkromma Point, consists of a rocky shore with occsional sandy beaches, and close eastward of Matjies River are two rocks, 50 feet high, while 1¼ miles eastward of the same river is the farthest out detached cluster of rocks, lying ¼ mile offshore; it should not be approached within a distance of 2 miles.

Komkromma or Salt River.—From Komkromma Point the coast turns to the northward for about ½ mile to the entrance to Komkromma River, off which the sea frequently breaks heavily; the river expands to a small lake directly within its entrance, and is said to be navigable by boats for 1 mile above its mouth.

Coast.—Groot River is about 2 miles eastward of Komkromma River, and within the eastern point of the former is a double peak; from Groot River to Aasvogel Point, a distance of 37 miles east-southeastward, the coast consists of perpendicular cliffs and rocky hills, from 300 to 600 feet high, and is intersected by streams and gorges, as presently described, with several dangers at a short distance offshore; it should not be approached within a distance of 2 miles.

In this extent of coast, the numerous streams which empty themselves into the sea take their rise in the Outeniqua Mountains, but none of them are navigable for vessels.

Between Plettenberg and Cape St. Francis, the dangerous coast has been the scene of several wrecks, as the proximity of the mountain chain to the coast, and the prevailing winds, occasionally cause dense fogs, and there is supposed to be an indraft current.

Mountains.—The Outeniqua Mountains, backing the coast at distances of from 4 to 8 miles inland in this locality, continue eastward to about 7 miles northeastward of Zitzikamma Point, and have several well-defined peaks, which from their appearance are very conspicuous and useful landmarks to seaman. Thumb Peak and Formosa Peak, the former so called from its appearance, 5,498 and 5,500 feet in height, respectively, are the highest and most remarkable; they are situated about 10 and 12 miles northeastward and east-northeastward, respectively, from Komkromma Point.

Between Formosa Peak and the coast, and 4 miles from the latter, is the Grenadier's Cap, 3,224 feet in height, conspicuous, and so named from its shape. Witte Els Berg, 20 miles east-southeastward on the same range, is a pyramidal peak, 4,098 feet in height, which, seen from eastward or westward, shows a flat top.

Karedouw Peak, 3,009 feet in height, shows as a saddle-shaped hill when nearly abreast it, but on other bearings has a flat top. The end of the Outeniqua Range, northeastward of Zitzikamma Point, is very conspicuous, terminating in a sharp conical hill, 1,634 feet in height, which drops suddenly to the plain extending to the shores of St. Francis Bay.

Elands River and Van Staden Ranges, northeastward of Cape St. Francis, are also conspicuous, the former having three peaks, the northwesternmost rising to 3,520 feet, and Eland and Sphinx Peaks, southeastward of it, to 3,240 and 2,660 feet, respectively. In clear weather, Mount Cockscomb, 37 miles northward of Cape Francis, and 27 miles inland from the head of the bay, is a conspicuous object, 5,750 feet high. The Van Staden Range terminates suddenly at its southeastern extreme in Brak River Hill, a remarkable jagged peak, 1,989 feet in height, and 5½ miles inland.

Coast.—From Groot River the coast for 2 miles eastward is backed by high wooded cliffs as far as Blue Rock River, which river may be known by the cliffs on its eastern side being bare, perpendicular, and fringed with white rocks. Between Blue Rock River and Storm Point, a distance of 15 miles, are deep ravines, and several streams run through the wooded coast. Wall Point, a conspicuous white point, 11 miles eastward of Blue Rock River, is so named from its perpendicular appearance.

Storm River, 4 miles eastward of Wall Point, is about 50 yards wide and flows through a gap between cliffs about 600 feet in height. Low shelving rocks on the western side partly shelter the entrance, and, under favorable circumstances, landing may be effected in boats a little inside the eastern entrance point, which point is skirted by rocks awash close to the shore.

Eastward of Storm River the forest is not so dense, and 5 miles southeastward is Faure River, a small stream. A sunken rock lies about ¼ mile offshore at 3 miles eastward of Storm River, and a long patch of sunken rocks, on which the sea breaks in bad weather, lies 1 mile off the entrance to Faure River.

Elands River, about 9 miles eastward of Storm River, may be known by some white rocks a little inside a point on its eastern side of entrance; it has several branches, and its banks a little inland are covered with dense bush. Eastward of Elands River the cliffs are not so thickly wooded.

Robhoek (Seal Corner Point) is about 2¼ miles eastward of Elands River, and about 1 mile eastward of the point the cliffs are nearly perpendicular, with rocks awash extending 200 yards from their foot.

At 2¾ miles farther eastward is the mouth of Witte Els, a small river from which sand, skirted by rocks, extends alongshore for 1½ miles to a high rock, with a ledge which covers at half tide extending nearly 1 mile in a northwesterly direction from it; thence eastward to Aasvogel Point, a distance of about 5 miles, there are several dangers awash at from 400 to 600 yards offshore. A number of farmhouses are situated along this coast about 1 mile inland.

Aasvogel (Vulture) Point may be known by the cliffs forming a hill 660 feet high, with a strip of sand ½ mile wide at the back of it; a rock awash lies 200 yards from the point.

Coast.—At 2½ miles westward of Karedouw Peak is a road through the mountain range, and at the same distance southeastward of the peak is Clarkson village, with a population of from 300 to 500 and a Moravian mission station.

From Aasvogel Point for 4 miles eastward the coast is of cliffs and appears free from outlying dangers, and at this distance, near a small stream, the land becomes higher, and rocks extend ½ mile from the shore; the coast then bends southeastward, with sandy beaches as far as the mouth of the Zitzikamma River. This shore should not be approached within a distance of 2 miles.

Zitzikamma Point and River.—Zitzikamma Point is 5½ miles southeastward of the small stream above mentioned, and at 3 miles is the river of the same name, its entrance being closed, but its position may be identified by some sand cliffs nearly 1 mile in extent on its western side, behind which the land attains a height of 729 feet; the land on the eastern side of the river is considerably lower. From the river to Zitzikamma Point, about 2 miles, the coast consists of several grassy ridges fringed with rocks, and several fresh-water streams run into the sea.

Zitzikamma Point is low and shelving, with rocks and breakers extending about ¾ mile offshore, and from it the coast, turning east-southeastward, is a succession of bushy hillocks from 50 to 120 feet high, with shelving rocks and breakers extending about ½ mile off them. The highest hill in the vicinity of the point is 596 feet.

Dangers.—An obstruction, on which a vessel drawing 21 feet water struck in 1910, is reported to be situated 188°, distant 3 miles, from Zitzikamma Point, but this position is approximate, and neither kelp, discolored water, nor breakers marked the locality.

Two rocks awash lie close off Wreck Point, about 5 miles east-southeastward of Zitzikamma Point.

Landing.—On the ridge, 1 mile within Wreck Point, is a conspicuous peak, 560 feet high, and about ½ mile east-southeastward of Wreck Point is a ledge of rocks, the eastern part, awash at low water, forming a cove where landing can sometimes be effected. Within the cove long shelving rocks and big bowlders uncover at low water, and on the western part there is a little sandy beach.

Reef (Klippen) Point, nearly 2 miles east-southeastward of Wreck Point, is a rocky point 30 feet high, with a cluster of rocks extending about 1,300 yards south-southeastward of it. The outer rock is nearly awash at low water and the inner one is 13 feet high.

Slang (Snake) Bay, immediately eastward of Reef Point, has on its western side low sandy cliffs, from 30 to 50 feet high, with patches of bush. Bare sand hills, from 200 to 300 feet high, fringe the bay for 3 miles. The shore is foul for ½ mile northeastward of Reef Point, but in other parts the bay appears free from rocks. A heavy surf rolls in.

Slang River, at the head of the bay, has its mouth closed, and another small stream discharges ¾ mile southeastward of Slang River; at the back of this the land gradually rises to a grassy ridge 596 feet high, while at 3 miles inland some white farmhouses are conspicuous from the westward.

Southeastward of the second river the coast consists of wooded hills from 200 to 250 feet high, fronted by low rocky cliffs from 10 to 20 feet high, and 2 miles from Slang River is White Point, with, at ¾ mile eastward of that point, a cove formed by a rocky ledge lying parallel with the shore; the cove is encumbered by bowlders which cover at high water, when, under favorable circumstances, it is stated that a boat may land.

Thys Point, 2 miles southeastward of White Point, forms the western point of Thys Bay, and is 50 feet high, with shelving and sunken rocks extending 700 yards from the shore. Thys Bay, a sandy bight about 1 mile in breadth, is apparently free from rocks, and has low sandy hillocks fringing it; at the eastern end is a sand hill 366 feet high, partially topped with bush, and here the sand is blown inland to a distance of 2 miles, forming a conspicuous stripe when seen from seaward.

From Thys Bay the coast line continues in an east-southeasterly direction, and is rocky and rugged, with grassy cliffs from 50 to 110 feet high.

Scholtz Kraal, a cliffy indentation, 2 miles eastward of Thys Bay, has in it several rocks, and at the head a small waterfall; in its vicinity rocks awash extend 600 yards offshore. Near the summit of a ridge, about ½ mile from the coast, is a farmhouse. In a rocky bight 1¼ miles southeastward of Scholtz Kraal the grassy cliffs and hills decrease in height, and the straight shore is fronted by rugged rocks from 10 to 30 feet high.

Seal Point, 3½ miles east-southeastward of Scholtz Kraal, is a rocky projection off the extreme of which are three rocks nearly awash, and at ½ mile southeastward of it is a reef ½ mile in extent, on which the sea breaks heavily in bad weather. Between Seal Point and Cape St. Francis is a bay receding about ½ mile northwestward, its shores being rocky, with large bowlders, but at its head is a low sandy beach, fronting a ridge of bushy sandy hillocks varying from 30 to 70 feet in height.

Light.—About 250 yards within the extreme of Seal Point is a white cylindrical tower, 91 feet in height, which exhibits, at an elevation of 118 feet above high water, a white flashing light with a red sector; in clear weather it should be visible from a distance of 16 miles. This is known as Cape St. Francis Light, and for the bearings of the red sector see Light List.

Caution.—In consequence of the want of sharpness in the change from red to white, the light may show red near the bearing of 242°, but the red light can not be seen at all from a vessel passing a safe distance along the coast, and therefore if seen it warns the mariner of his dangerous approach to the shore.

Lloyd's signal station.—A Lloyd's signal station is situated on Seal Point near the lighthouse; it is in telegraphic communication with the ports of the colony, and vessels can communicate with it by the International Code.

Cape St. Francis, a very prominent point projecting southeastward, appears both from eastward and westward as two bushy hummocks with a bare sand ridge between; the northern hummock is 140 feet and the southern 110 feet high. Its position may also be known in clear weather by the bearing of Mount Cockscomb, 37 miles north-northeastward, and also by an extensive plain inland.

Humansdorp village, nearly 11 miles northward of Cape St. Francis, is conspicuous from seaward, and behind it are two remarkable mountains. Kruisfontein's Berg, 2,574 feet high, the nearer of the two, and 7 miles northwestward of the village, has a double peak; the other, about 11 miles northward, is Rondebosh Berg, a sharp peak, 2,924 feet high.

Immediately off the cape are two rocks, 11 feet and 9 feet high, with low-water rocks between, terminating in a reef extending about 1,200 yards southeastward of the cape.

Vessels from the westward rounding Cape St. Francis should give Seal Point a berth of 2 miles, and not bring it southward of 264° until either the high sand hill in Krom Bay or the western end of the beach is open eastward of Cape St. Francis, bearing about 290°.

Krom Bay, formed between Cape St. Francis and Zeekoe Point, 7 miles northeastward, has a rocky irregular shore, backed by grassy hills, for 1½ miles northward of the cape, with two rocks, 4 feet above water, about 200 yards offshore, from this sand hills 200 feet in height commence, their bases fringed with rocks and bowlders for about ¾ mile to the beginning of the sandy beach, at which point a long ledge of bowlders uncovers at low water.

Between the commencement of the sandy beach and Zeekoe Point is a succession of bushy sand hillocks fronted by a sandy beach, which, southwestward of Krom River, is flat and free from rocks. The highest hillock between Krom River and Zeekoe Point is 67 feet, and just behind it is a spring of fresh water.

Anchorage.—The bay affords good anchorage in depths of 9 or 10 fathoms, over sandy bottom, with Cape St. Francis bearing 202°, distant about 2 miles, and about the same distance off the mouth of the Krom River. The shelter is good in westerly gales, but the bay is not safe with easterly winds, though probably no worse than Algoa Bay; southwesterly winds are the worst for swell. Several farmhouses are situated in the neighborhood of the bay.

Landing.—There is generally a heavy surf on the shore, but with westerly winds landing may be effected at the commencement of the sandy beach, where the ledge of bowlders uncovers at low water, at which time and place the best landing will be found on a sandy beach between two ledges of rock.

Tides.—It is high water, full and change, in Krom Bay at 3 h. 34 m.; springs rise about 5 feet. Southeasterly winds reduce the rise and northwesterly winds increase it.

Krom River, off which shoal water extends somewhat farther than elsewhere in the bay, is not navigable and the bar is impassable for boats. At low water there is about 1 foot on it, and the mouth is contracted to a width of about 33 yards, but at high water, the sand being very flat, the entrance is about 400 yards wide; within the entrance the water is deeper. There is a ford about 2 miles above the mouth, and near it are several farmhouses.

Humansdorp, 7½ miles in a direct line from the mouth of Krom River, on the main road between Cape Town and Port Elizabeth, contains a population approaching 2,000, and gives its name to the district; it has postal and telegraphic communication with all parts of the colony, and is 56 miles from Port Elizabeth. Ostrich farming is carried on with marked success in this locality.

Zeekoe (Sea Cow) River, 4½ miles eastward of Krom River, is broad but generally closed by sand; at ¾ mile from its mouth the river bifurcates, the western branch taking its rise near Humansdorp. The hillocks fringing the intervening coast are about 100 feet high, and there are rocky ledges projecting from the sandy beach, all of which nearly cover at high water. The water is fresh at 2 miles from the sea.

St. Francis Bay is the long bight of the coast between Zeekoe and Glassen Points, the latter 25 miles eastward, the bay receding about 6 miles from that line; it is free from off-lying dangers.

Coast.—Zeekoe Point, 102 feet in height, is ½ mile eastward of the Zeekoe River and 1½ miles northward of the point, in a sandy bight between two ledges, is Jeffrys Bight, where there is a fishing establishment, a two-storied building, and some cottages. Noors Kloof Point, 1½ miles northeastward of Jeffrys Bight, is a wooded hillock near the termination of a back ridge of hills. The beach northward of it is comparatively free from rocks.

Landing.—Jeffrys Bight is considered to be one of the best landing places in the locality in fine weather.

Kabeljou River, closed at its mouth, is about 2 miles northward of Noors Kloof Point, the land in the rear for 3 miles to the eastward being an elevated plain, and nearly midway between the Kabeljou and Gamtoos Rivers are some conspicuous farm buildings about 1 mile from the beach. The frontier road crosses Kabeljou River about 1 mile from its mouth, and at this place fresh water may be obtained.

Gamtoos River, at the head of St. Francis Bay, has a bar nearly dry at low water, springs, but there is deep water inside, and the tidal influence is felt for about 8 miles up. A ferry crosses to the main road at 3 miles within the entrance. The eastern point of the river consists of low sand hills, but on the opposite side the hills form bluffs, which are conspicuous from seaward.

Coast.—Eastward of the Gamtoos River, the bare sand hills increase considerably in height, forming ridges perpendicular to the coast.

Van Staden River, also closed at its mouth, is 9 miles eastward of the Gamtoos River and may be known by the high sand hills which form a saddle sand peak on its western side. The abrupt termination of the Van Staden Hills, and the double peak of Brak River Hill, 1,989 feet high and 5 miles inland, are good marks for identifying this locality.

Maitland River, 3¼ miles east-southeastward of Van Staden River, may be identified by the sand extending some distance inland at its western side, forming a conspicuous round hill, and by another high sand patch about 1½ miles eastward of it. Like all the other rivers, it is dry at its mouth. There are several farms along the banks, and lead has been found in a mine about 2 miles from its mouth.

Glassen Point, 7 miles southeastward of Maitland River, the coast between being foul in places for about ¼ mile, is fronted for a width of ½ mile by a rocky ledge on which the sea breaks with violence during heavy gales; the cliffs near the point are the sudden termination of bushy hills about 150 feet in height. At 1½ miles inland are two hills; the western hill is wooded, but the top of Lovemore Hill, the eastern one, 690 feet above the sea, is bare, with a conspicuous clump of trees near its western slope.

Coast.—At 4 miles eastward of Lovemore Hill, near the eastern extreme of a wooded ridge, is Buffels Fontein or Botha Kop, 915 feet high, with a bluff termination; near it are several buildings.

Chelsea Point is about 10 miles eastward of Glassen Point, the coast consisting of cliffy points with sand beaches between, and sunken ledges extending in places about ¼ mile offshore. Chelsea Point is shelving, with several conspicuous grassy hillocks, the highest being 103 feet high, and at the back are some high sand hills. Off the point are two rocks above high water, and sunken dangers extend about ¾ mile offshore.

Foul ground has been reported to exist about 1 mile from the shore westward of Chelsea Point for a distance of about 5 miles, and it is also not improbable that the unsounded area fronting the coast between Chelsea and Glassen Points may contain many hidden, and as yet unknown, dangers.

The bay between Chelsea Point and Cape Recife is fringed with sunken ledges.

General directions.—From Cape Seal to Zitzikamma Point the shore should not be approached by steam vessels within 2 or 3 miles, and by night or in thick weather, a vessel should not stand into less than 45 fathoms. Between Zitzikamma Point and Cape St. Francis, the same distance should be preserved by day; but by night or in thick weather, owing to the irregularity of the soundings and to the probability of the current setting directly toward the shore, the coast should not be approached to less than a depth of 70 fathoms.

Between Capes St. Francis and Recife, the same distance must be observed by day; and by night, until the vicinity of Glassen Point is approached, the vessel may go into 45 fathoms, but in thick weather and by night, no nearer to Cape Recife than a depth of 60 fathoms.

Sailing vessels, as before stated, should preserve an offing of at least 8 miles.

Current—Caution.—On this part of the coast a current sometimes sets directly toward the shore, or in a northeasterly direction, and a vessel bound eastward or westward should therefore avoid hugging the land by night or in bad weather, especially as dense fogs are not uncommon. From Cape Agulhas eastward to Buffalo River, the current has been known not only to set westward along, but toward the coast, especially opposite bays.

A weak east-going current runs near the shore all along the coast between Capes Seal and Recife, but in the offing, as a rule, the Agulhas Current sets westward at rates of from 1 knot to 2 knots an hour, and off the edge of the bank of soundings as much as 3½ or 4 knots.

Cape Recife is low, but the hillock of Recife, northwestward of it, being higher, is often seen some time before the lighthouse is made out. Approaching the land from the southward during daylight, Cape St. Francis has been mistaken for Cape Recife, but they may be distinguished by Recife Hillock appearing at a distance as the termination of the coastline, and by a remarkable strip of bare white sand immediately westward of the hillock, appearing like a beach, also by the differently colored lighthouses.

Light.—Near the extreme of Cape Recife is a stone tower 80 feet in height, with four alternate red and white bands, which exhibits, at an elevation of 93 feet above high water, a fixed white and flashing light, with a red sector; the fixed light should be visible in clear weather from a distance of 15 miles, and the flashing light from 6 miles, but the power of the red light is considerably less than that of the white light, and, under certain atmospheric conditions the fixed light may become invisible, the flash only appearing. For bearings of red sector, which covers Dispatch Rock, see Light List.

Lloyd's signal station.—A Lloyd's signal station at Cape Recife is connected with the telegraphic system of the colony, and vessels can communicate by means of the International Code. Telegraphic communication exists between Cape Recife, Cape St. Francis, and Port Elizabeth.

Dangers.—Thunderbolt Reef, about 700 yards in extent, lies with its center about 1,800 yards, 199°, from Cape Recife Lighthouse; the sea generally breaks heavily on it, but not always at high water and in fine weather. The 5-fathom contour line, surrounding the reef, passes about ½ mile from Cape Recife, and from the coast northward of the cape.

Caution.—There is an indraft toward this reef and the cape, and no sailing vessel should attempt to approach either within a distance of 2 miles, unless with a commanding breeze.

As the depths about the cape and reef decrease suddenly from 10 fathoms, vessels should not go into less than 12 fathoms.

CHAPTER IV.

CAPE RECIFE TO CAPE MORGAN.

Algoa Bay, contained between Cape Recife on the west and Woody Cape on the east, which two points are 33 miles apart in an east and west direction, is subject to the full force of the southeasterly gales, which blow so violently at times between October and April, but in the southwestern corner of the bay is Port Elizabeth, off which there is usually safe and convenient anchorage at all times of the year.

Dispatch or Roman Rock, with a least depth of 1¼ fathoms and steep-to on its eastern side, lies nearly 1 mile offshore, and 3 miles, 353°, from Cape Recife Lighthouse.

Beacons.—About 500 yards northward of Cape Recife Lighthouse stands a red stone beacon, 25 feet high, and about 2½ miles northwestward of Cape Recife, near Beacon Point, are two stone beacons, 1,200 yards, 56° and 236°, from each other; each beacon is 25 feet high, surmounted by a ball, and has alternate red and white bands.

Riy Bank, about 1 mile in extent and composed of uneven rocky ground, with depths of from 6 to 14 fathoms, breaks heavily during and after bad weather; the shallowest spot, 6 fathoms, lies 8½ miles, 74°, from Cape Recife Lighthouse.

Port Elizabeth consists of the open roadstead, fronting the town, and three iron jetties extending from the latter.

Jetties.—Dom Pedro Jetty, the southernmost of these, extends for 1,462 feet in a direction 50° from the shore, and about 400 yards northwestward of it is the South Jetty, which has a total length of about 1,180 feet in a 68° direction, including its approach.

The North Jetty, nearly 800 yards farther northwestward, extends about 68° for a similar distance to the South Jetty, the spaces between them being nearly filled with shore bank, under 3 fathoms. The jetties are equipped with hydraulic cranes of the latest description, capable of dealing with 7,000 tons of cargo daily; there are also hydraulic capstans and screw moorings, with arrangements for watering and ballasting alongside, and the railway runs on all the jetties.

An isolated landing stage for dynamite or other explosives is situated to the northward of the port.

Dom Pedro Jetty will accommodate vessels drawing 20 feet at it, while the South Jetty has from 14 to 21 feet alongside; the North Jetty has from 12 to 22 feet, and vessels drawing not more than 20 feet are allowed alongside, on due notice being given to the harbor master.

Lights.—On a hill at the back of the town, near Lady Donkin's Monument, is a white octagonal tower, 56 feet in height to the top of the dome, which exhibits, at an elevation of 225 feet above high water, a white occulting light with two red sectors; in clear weather it should be visible from a distance of 21 miles. On account of the greater height and brilliancy of this light, it is usually seen by vessels coming from the eastward before Cape Recife Light.

Near the extreme of Dom Pedro Jetty a white occulting light is exhibited at an elevation of 32 feet above high water, and should be visible in clear weather from a distance of 6 miles.

A fixed red light is shown from the South Jetty, and a fixed light, with white and green sectors, from the North Jetty. For bearings through which these lights are visible, see Light List.

During onshore gales a fixed white light is shown at the gas works to the northward of the town.

Depths.—The 5-fathoms contour line is about ¼ mile outside the jetty heads, and between that and the 10-fathoms contour is a distance of about 1¼ miles, in which area is the anchorage.

Strutts Reef, about 50 yards in extent and having 2½ fathoms water over it, lies about 200 yards north-northwestward of the head of Dom Pedro Jetty, the light from which is visible over it, but the reef is covered by the red sector of the town light.

Buoy.—A green buoy is moored on the northeast side of Strutts Reef.

Mooring buoys are placed near Dom Pedro Jetty to assist vessels berthing there.

Pilots.—Licensed pilots may be obtained, but pilotage is not compulsory.

Tugs.—Four tugs, three being fitted with salvage appliances, are available.

Directions.—Coming from the westward, and having rounded Cape Recife at a distance of about 2 miles, steer about 346°, keeping the lighthouse open eastward of the red beacon northward of it, bearing about 190° until northward of the line of the two beacons marking Dispatch Rock, which are in one bearing 236°, and the vessel then being northward of Dispatch Rock may be steered toward the anchorage or jetties.

A strong indraft is often experienced after passing Thunderbolt Reef and Cape Recife, and allowance should be made for it in passing Dispatch Rock, as it is not prudent for vessels, especially those of deep draft, to attempt to pass between that rock and the mainland.

By night.—Cape Recife may be rounded at distances of from 2 to 3 miles, or in not less than 20 fathoms, allowing for a probable indraft toward Thunderbolt Reef and the cape, and if the cape is rounded at the latter distance a vessel would enter the red sector from Port Elizabeth Light when Cape Recife Light bears about 295°.

When Cape Recife Light bears 290° a course 346° may be steered, keeping in the white sector of light from Cape Recife and not entering its red sector until Port Elizabeth Light changes from red to white, when the vessel, being northward of Dispatch Rock, may be edged gradually in for the anchorage or for the jetties, being guided by Port Elizabeth and the jetty lights.

Coming from the eastward or working, a vessel should be kept in the white sector of Port Elizabeth Light, care being taken not to cross its southern limit into the red sector, which covers Riy Bank as well as Dispatch Rock.

Vessels leaving Port Elizabeth and proceeding eastward are recommended to take the passage northward of Bird Island in fine weather.

Anchorage.—The anchorage for vessels of war and mail steamers is in a space between two lines formed by two white marks on the sea wall which, in line with Port Elizabeth Lighthouse bearing 235° and 246°, marks its south and north limits, respectively. Cargo steamers anchor to the southward of this space, and sailing vessels to the northward of it.

When southerly or southeasterly winds are expected, it is advisable to anchor with the starboard anchor, as, on account of the undertow, the cable would otherwise be frequently across the stem, and when mooring the starboard anchor should be the southern, for the same reason.

During summer, when east or southeast gales may be expected, vessels of war should anchor with plenty of room to veer; the holding ground is good, and there should not be much risk in riding out these gales, but vessels should always be prepared to leave the anchorage if necessary, as in gales of unusual severity numbers of vessels have been driven onshore, although these were principally sailing vessels.

Life-saving apparatus.—Two lifeboats and one complete set of rocket apparatus are maintained at Port Elizabeth.

Signals.—The signal station is on the hill near Lady Donkin's Monument and the lighthouse, and vessels can make their wishes known to their agents in bad weather by International Code. Vessels not having the code can make the following signals with their ensigns:

1. Ensign in the fore-topmast rigging: Am in want of a cable.
2. Ensign in the main-topmast rigging: Am in want of an anchor.
3. Ensign in the fore rigging: Have parted a bower cable.
4. Ensign in the main rigging: Am in want of an anchor and cable.
5. Wheft where best seen: Send a boat.

The following are also signals which may be made by the International Code from the port office, through the above signal station:

O. P. L.=Clear hawse.
F. P.=Prepare for bad weather.
K. U.=Veer cable.
K. C.=Hoist a light during the night.
H. R. P.=Shorten in cable to the same scope as when first moored.

Caution.—When the signal to prepare for bad weather is made from the signal station, sailing vessels, doubtful of being able to ride out a gale at anchor, should get under way and proceed to sea with as little delay as possible, making the first board on the starboard tack.

Port regulations.—1. Vessels about to discharge or receive cargo are berthed by the harbor master as close to the North Jetty as safety or convenience permits. If anchored off, sailing vessels must be moored with two bower anchors, open hawse to the southeast, and special care taken not to give other vessels a foul berth. All vessels not provided with ground tackle according to Lloyd's scale will be anchored northward of vessels properly provided.

2 Vessels touching for supplies may ride at single anchor, but well to the northward, to prevent danger to vessels moored in case of drifting; when riding at single anchor vessels should veer to 70 or 80 fathoms, other bower cables should be ranged and the anchors clear.

3. The hawse must always be kept clear when moored, and, whether at single anchor or moored, the sheet anchor should be ready. The vessel's position should be fixed by landmarks, and should she drift or lose her anchors the harbor master must at once be notified in writing.

4. Sailing vessels should be kept as snug as possible aloft, especially such as remain for some time. Top-gallant masts and yards should be sent on deck, but topsails, courses, etc., should be kept bent and reefed, whilst discharging cargo, until the vessel is too light to work out to sea in case of parting, when they may be unbent and repaired if necessary and bent again directly sufficient cargo has been shipped to render the vessel manageable under sail.

Masters of vessels are warned against housing top-gallant masts, instead of sending them on deck, a practice which has caused several wrecks, and always endangers vessels by preventing the topsails being hoisted when required to enable them to beat out to sea.

5. To prevent injury to the jetties by drifting vessels, no sailing vessel is permitted to lie southward of a line drawn from Port Elizabeth Lighthouse through the northern white mark on the sea wall. Steam vessels with cargo anchor southward of a line from Port Elizabeth Lighthouse through the southern white mark.

6. Vessels, having veered cable in a strong breeze, must always shorten in again to the original scope, on the return of moderate weather.

7. All signals, made from the Hill signal station, must be answered from the shipping and strictly obeyed; any vessels disregarding them will be reported to Lloyd's, as also to the owners.

8. A vessel, parting cable and unable to work out, should run for the sandy beach to the northward of the town, directly in front of the gas house, at the northern end of the sea wall; by night, the spot is indicated by the white gas house light. Vessels should keep their headsails set even after striking, to assist in grounding the vessel firmly. No person should attempt to quit a vessel until the lifeboat arrives alongside, or communication is established with the shore by means of the life-saving apparatus or otherwise.

9. When unsafe to work cargo, a blue flag is hoisted on the flagstaff on the North Jetty, and no cargo boat or other craft is allowed alongside either of the jetties whilst that flag is flying.

10. When the red ball, or danger signal, is hoisted at the same flagstaff, any persons attempting to land at the jetties are liable to a fine of £20 (about $100) or, in default, to imprisonment; and no boats are allowed to leave the jetties except in cases of emergency, and then only by special permission of the harbor master or his deputy.

Landing can be effected except in very heavy weather, and passengers are landed by privately owned tugs.

Tides.—It is high water, full and change, at Port Elizabeth, at 3 h. 20 m.; springs rise 5¾ feet; neaps rise 4 feet; neaps range 2¼ feet. The tides, often irregular, are influenced by the wind, and the surface stream, which is very weak, is uncertain in its direction.

Signals to stranded vessels.—The following signals may be made to stranded vessels from the most conveinient point on the shore. At night: By means of transparent figures. By day: By means of white figures on a black board.

No. 1. You are earnestly requested to remain on board until assistance is sent; there is no danger to life.

No. 2. Send a line on shore, by cask, and look out for a line by rocket or mortar.

No. 3. Secure the line, bend a warp or hawser to it, for us to haul on shore, taking care to secure the warp well on board.

No. 4. Prepare to haul on board the end of the warp, which we will send you by means of the line, and secure it well.

No. 5. Lifeboat will communicate at low water, or as soon as practicable; have good long lines ready for her, and prepare to leave the vessel; no baggage will be allowed in the lifeboat.

No. 6. Secure the warp to the lower masthead, bowsprit end, or some other convenient place, and send a hauling line to us, that we may get you on shore by means of a traveler.

Answers from stranded vessels.—By day: A man will stand on the most conspicuous part of the vessel and wave his hat three times over his head. By night: A light will be shown over the side of the vessel where best seen.

Winds.—Easterly and southeasterly gales, the only dangerous winds in Algoa Bay, occur in the summer months from October to April, the worst weather usually happening at the commencement and close of the season. In the winter months the wind seldom blows from these quarters, except in the rare case when what is known as a black southeaster comes on, with rain and thick weather, of which the appearance of the sky and sea gives sufficient warning. Black southeasters are most frequent in October and November; they do not last long, but sometimes are violent.

The approach of summer gales is to a certain extent foretold by the irregular oscillations of the barometer, which, although constantly high compared with what it would be under similar circumstances in westerly winds, falls before the wind increases. A damp, cold air prevails, and there is a constant hazy appearance about the horizon, the upper parts of the sky remaining clear. Should the barometer be at 30.5 inches, and cirrus clouds appear, a southeast gale will set in before 24 hours have elapsed; or if the hills to the northward of Port Elizabeth be obscured by haze a gale from the same quarter may be expected; gales from this quarter rarely occur during the month of April.

With the gale at its height a heavy and dangerous breaking sea rolls in, but vessels with plenty of cable generally ride easily; and, from the strong easterly set which prevails near the shore during these gales, it is probable that a powerful undertow assists to relieve the strain.

Town.—The town of Port Elizabeth, named after Lady Elizebeth Donkin, who visited the place in 1820, for the purpose of locating British settlers, is the principal seaport of the eastern part of the colony; its geographical position, with reference to the other colonies, and as a port of call or refuge for vessels from the eastward, giving it considerable importance.

The principal buildings, some handsome structures, are the town hall, the library, the provincial hospital, with Grey Institute, London and South African and Standard banks, halls belonging to various societies, the Masonic temple, the customhouse, numerous churches, markets, etc. The St. George and Prince Alfred are two public parks, and the Baakens River, entering the sea after passing through the town, is spanned by several bridges. In 1912 the population was 44,081.

Communication.—The port has frequent communication by sea by the principal lines of steam vessels.

Port Elizabeth is the coastal terminus of the Midland railway system, which joints the Western system at De Aar Junction, a distance of 339 miles, with branches at Zwartkop, 7 miles from Port Elizabeth, forming a loop-line 276 miles in length, which joins the line again at Rosmead from Port Elizabeth, while branches skirt the coast of Francis Bay on the west and Algoa Bay on the east.

At Alicedale, 72 miles, in a branch to Port Alfred; at Klipplaat, 123 miles, to Mossel Bay, via Oudtshoorn; at Cookhouse, 127 miles, a short branch to Somerset East and a line to East London; and at Naauwpoort, 270 miles, is the trunk line to the Orange River Colony, the Rosmead-Stormberg Line, forming another connection between the Midland and Eastern systems. There are also several smaller branches.

There is telegraphic communication with all parts.

Coal and supplies.—About 400 tons of Natal coal are kept in stock, the supply being brought by rail from the mines; coaling is carried on by bags, and about 500 tons could be put on board in 24 hours, but southeast winds might interfere with coaling. About 40 lighters, each holding an average of 85 tons, are available, and the jetties have been already mentioned.

Fresh meat, vegetables, and bread are plentiful, and the water, which is good, is supplied on application to the harbor master to vessels in the roadstead by means of two tank vessels, one of which is fitted with steam pumps.

Patent slip.—A patent slip is situated about 1 mile southward of Dom Pedro Jetty.

Repairs.—Large repairs to machinery can be undertaken by an engineering firm, and a crane will lift 20 tons. There are two small steam hammers.

Trade.—The principal exports of wool, hides, ivory, ostrich feathers, tallow, and angora hair, etc., were valued at about $19,380,000 in 1912 and the imports, consisting of general merchandise, at about $45,423,175.

Time signal.—At Port Elizabeth Lighthouse, at an elevation of 220 feet above high water, a black ball is dropped by electricity from the Cape Observatory at 0 h. 0 m. 0 s. South Africa standard time, corresponding to 22 h. 0 m. 0 s. Greenwich mean time; but the signal is not made on Sundays or public holidays. Should the signal be inaccurate, a checkered red and blue flag will be hoisted at the lighthouse and the ball dropped 5 minutes later, or at 0 h. 5 m. 0 s. South Africa standard time.

Zwartkop River, about 5½ miles northward of Port Elizabeth, has a few feet on the bar at low water, but the surf is frequently heavy. The river is navigable for small vessels for 8 or 9 miles from its mouth.

Communication.—At Zwartkop Junction is a branch known as the Uitenhage-Graaff Reinet loop line, which joins the line again at Rosmead, a distance of 276 miles.

Coast.—The coast from the entrance to Zwartkop River curves round to the eastward, and at about 5 miles is the Coega River, barred at its mouth; the water, which is salt, discharges into a lake, the outlet of which is also barred.

Jahleel Island, 300 yards long and 47 feet high, lies about 1,000 yards off the Coega River, with a channel between having a depth of 6 fathoms, the deepest water being about one-third of the distance from the island.

St. Croix Island, 3 miles eastward of Jahleel Island and 2 miles offshore, was so named by Bartholomew Diaz, the first European who landed there. It is about 800 yards long by 400 yards wide, with a surface of nearly bare rock, its western peak being 195 feet high. It is the resort of penguins and gulls, and was formerly used as a temporary stopping place by sealers.

There is fair anchorage about 600 yards northwestward of St. Croix Island, in a depth of 10 fathoms, over sand, with its western peak bearing 140°. In this position the heavy sea caused by east and southeast gales is considerably broken, but the extent of sheltered anchorage is confined to a very small space by the shape of the island.

Brenton Rock, $1\frac{1}{10}$ miles southward of St. Croix, is 50 feet high, about 200 yards long, and fairly steep-to.

Sunday River, about 9½ miles east-northeastward of Coega River, enters the sea close to a remarkable rock named Read's Monument, after a midshipman who was drowned when surveying this coast; the surf breaks violently on the bar of the river, over which boats can rarely pass.

Coast.—From Sunday River eastward to Cape Padrone, the coast consists of a monotonous chain of sand hills, extending inland from 1 to 1½ miles, several of them rising to heights of from 350 to 450 feet, being bare; at the back of these sand hills the country attains a height of 1,200 feet, and is covered with grass and forest. From Sunday River the coast curves gradually round to the east-southeastward for 21 miles to Woody Cape, which has a cliff 173 feet high.

Bird Islands, a cluster of low, rocky islets lying about 30 miles east-northeastward of Cape Recife, and nearly 5 miles southward of Woody Cape, consists of Bird, Seal, and Stag Islands, with several rocks and shoals surrounding them. Bird Island, the largest, on which stands the lighthouse, is 33 feet high, about 800 yards long, and 630 yards wide. Sea-fowl eggs are abundant in November and December, and a palatable vegetable, not unlike spinach to the taste, grows on the island, but the only water likely to be found might be a small quantity left in hollows of rocks after rain.

Light.—The lighthouse, a square stone tower 85 feet in height, stands near the southern end of the island, and from it is exhibited, at an elevation of 100 feet above high water, a white group-flashing light; in clear weather it should be visible from a distance of 16 miles.

Seal and Stag Islets, from 400 to 600 yards north-northwestward of Bird Island, are connected at low water, and northeastward of them are rocky patches extending westward and eastward over a space 1,600 yards in extent, and having from 2 to 3 fathoms water; the central rocks, named North Patch, about 1 mile northward of the lighthouse, are above water.

Black Rocks, about 1,400 yards westward of Stal Islet, are five black rocky islets, with a narrow 2¼-fathom passage between, but it is only during very fine weather that these islets are not surrounded with heavy breakers.

Rocks.—Southwestward and southward of Bird Island are West Rock, Doddington Rock, and East Reef, the two former being awash, and the later with 2¾-fathoms water, but the sea is seldom so smooth as not to break on it.

Between and around these rocks and islands the depths are irregular, and during bad weather a heavy sea rolls over the whole of this space, breaking in from 8 to 10 fathoms to seaward of the group. In thick weather a vessel should not approach them into less than 60 fathoms.

The steamer *Obell* is reported to have struck an obstruction 4 miles 133° from Bird Island Lighthouse. Approximate position: latitude 33° 53′ 15″ south, longitude 26° 21′ east.

Anchorage.—The Bird Island group affords indifferent anchorage on the northern side, but the holding ground is not good, and the bottom uneven. With southeasterly winds the lighthouse seen between Stag and Seal Islets, bearing 146°, in depths of 10 or 11 fathoms, is a good spot for shelter, but should the wind shift and become strong from the westward, anchor more to the eastward, with the Black Rocks in line with Stag Islet, about 254°, or a little open on either side of it, in from 8 to 10 fathoms, but the holding ground is bad, as from this latter position, with 75 fathoms of cable out, the British naval vessel *Geyser* drove to sea in a heavy west-southwest gale.

Landing.—It frequently happens that there is no possibility of landing, rollers setting in during calm weather as well as in a gale. After these have subsided, care is necessary in landing, as the sea sometimes breaks heavily and unexpectedly right across the entrance to the space between the islands. The lighthouse in line with the first or western rock that shows on the white patch at the eastern end of Bird Island, bearing about 236°, is the best direction to pull in upon, as it leads between the breakers on the spit and those off the end of Bird Island.

Tides.—It is high water, full and change, at the Bird Islands at 4 h. 0 m.; springs rise from 4½ feet.

Current.—No regular tidal stream exists in the vicinity, but at the northern anchorage the current generally sets eastward. On one occasion, during a strong westerly gale, its rate was observed to be 1½ knots, but on two other occasions during westerly gales, it set to the westward.

Bird Island Passage—Directions.—If bound eastward from Algoa Bay in favorable weather, Bird Island Passage is recommended, as it avoids the strong southwest-going current always running outside. The channel is 3 miles wide and clear of danger, the depths being from 8 to 17 fathoms, and a vessel may run along the land at a distance of from 2 to 3 miles the whole way to Buffalo River.

Vessels passing inside the islands during the night, and particularly steam vessels, are recommended to keep nearer the mainland than to the group, as the land is higher and more readily discerned and the constant roar of the surf more distinctly heard than the breakers on the rocky reefs of the group. With care, the lead will indicate a too near approach to the main shore, and from 12 to 15 fathoms is a safe depth in passing. A wide berth should be given to Cape Padrone, off which foul ground extends about 1,000 yards.

A vessel, passing outside the group, should not approach within 3 miles of the lighthouse, as no advantage is gained by it, and the current, though not generally strong, is uncertain and irregular both in strength and direction in the vicinity of the group. Steam vessels from Algoa Bay to Port Natal generally skirt the coast, but sailing vessels should keep about 100 miles from land in order to avoid the strength of the Agulhas current.

Coast.—The first break in the sandy feature of the coast occurs at Woody Cape, where the sand hills are covered with dark bushes. They present to seaward a series of sandstone cliffs fronted by a rocky beach which extends 2 miles alongshore, when sand hills are again met with and continue as far as Cape Padrone.

Water.—Fresh water is found welling out from the base of the sand hills at Woody Cape, and about Cape Padrone, and by digging into the sand, above high-water mark, fresh water may be found almost everywhere along this coast.

Coast.—From Cape Padrone to Keiskamma Point, a distance of nearly 60 miles, the coast is mostly backed by hills, faced with sand to heights of from 100 to 250 feet, with the exception of the first 20 miles, where the sand is much lower. This coast is intersected by streams, and the land near the shore presents a fine tract of pasture country, with large patches under cultivation.

From the offing, in the vicinity of Cape Padrone, the most remarkable features are Nanquas Peak, about 3¼ miles northeastward of the Cape, which is 985 feet in height, and the high sand hills to the westward toward Woody Cape. Nanquas Peak, when seen from the southward, appears flat-topped, but proceeding eastward, it assumes a conical form, and is the most conspicuous object on this part of the coast.

Bokness Hill, 660 feet high, and about 3¼ miles northeastward of Nanquas Peak, is a flat-topped, bushy hill; from thence to Glendower Peak, 622 feet high, and surmounted by a stone beacon, about 14 miles beyond, the land is lower, uneven, and intersected by many ravines.

When near the shore, False Islet, or Kwaai Hoek, and the east head of Bushmen River, become conspicuous; the former, as its name implies, resembling an islet. Karega and Kasuga Rivers, 1½ and 4½ miles, respectively, east-northeastward of Bushmen River, are noticeable, and from off the latter several houses may be seen near its mouth.

The Kowie River, with the house resembling a castle on its western and the village on the cultivated slope on the eastern bank, also the high head over Riet (Reed) Point, serve to identify this part of the coast. The hills at Bathurst, 7 miles northward of Kowie River entrance, and the range of mountains in the vicinity of Grahamstown, are also conspicuous.

From Riet Point to Kleinemond River, 2½ miles farther, the hills again become low, as also the land behind, and about midway are the Black Rocks or Three Sisters; 3½ miles east-northeastward to Great Fish Point sand-faced hills become high, and when within about 1½ miles of the point there is a bare-topped sand hill which may be recognized from distances of 10 or 12 miles offshore.

The coast, turning northeastward for 2 miles to Great Fish River, is comparatively low, as well as is the land behind, which is a grassy plain intersected with ravines, while curving eastward to Stalwart Point the sand-faced hills are tolerably high, and about midway, 2 or 3 miles inland, are two peaked grassy hills, near Maitland village, visible from all directions; these, with a dark head over Stalwart Point, and the points previously mentioned, all form good marks in this neighborhood.

Farther east-northeastward are the Umtata River sand hills, the Bequa River, with the high bare-topped sand hill westward of it, together with Schietkop, a round-topped grassy hill 327 feet high, northwestward of Bequa River; Patos Kop, a square, flat-topped grassy hill 900 feet in height, lies about 9 miles northwestward from Keiskamma Point, which latter has a hill close over it with a house on its summit.

General directions.—From Cape Padrone to Bokness River and thence to Keiskamma Point the shore should not be approached within a distance of 2 miles, and by night or in thick weather, not in a less depth than 40 fathoms. The offshore depths within the 100-fathoms contour line are tolerably regular, the bottom being sand and shells, though to the westward these are frequently intermingled with black specks. The edge of the bank is steep, dropping from 100 to 200 and 300 fathoms in less than 1 mile.

During westerly gales the sea is much smoother on than off the bank, the edge of which is thus generally well defined.

Currents.—The Agulhas Current off this part of the coast, from the Bashee River westward, generally sets west-southwestward, varying in strength from 1 knot near the shore to 3½ or 4 knots near the edge of the bank. A weak current sets eastward near the coast at uncertain times, and close to the shore an eddy often sets eastward, but its rate seldom exceeds ½ knot. In calm weather, and in places off the edge of the bank southward and eastward of Cape Padrone, the current has been observed running like a race or overfall.

Cape Padrone, 8 miles eastward of Woody Cape, consists of sand cliffs exceeding 100 feet in height, with sand hills extending nearly 1 mile within it, and rising to a ridge of bushy hills 340 feet in height, behind which may be seen a few houses. Several outlying rocks, some of which show at low water, extend 800 yards off the coast immediately eastward of the cape, the sea sometimes breaking heavily on them.

Patches of foul ground, on which the sea breaks in heavy weather, extend about 1 mile off two rocky projections at 3 and 6 miles, respectively, east-northeastward of Cape Padrone, and to less distances on either side of them and farther eastward the coast continues to be fringed with rocks.

At Bokness River, the mouth of which is closed, the coast ridge is about 100 feet high, covered with bush, and sand extends some distance up its sea face; for 2 miles farther eastward to False Islet the shore is sandy.

False Islet, or Kwaai Hoek, a dark-looking headland, 85 feet high, extending ½ mile in an east and west direction, is nearly perpendicular on its sea face, and is connected with the mainland by sandy hillocks; from seaward the head shows out against the white sand and resembles an islet.

Several rocks, showing at low water, extend 600 yards from the southwestern part of the islet, and the point next eastward is foul to a distance of about 800 yards, with rocks awash at low water.

Rock.—A rock, on which the sea breaks heavily, formerly reported by coasters and seen by British naval vessel *Flirt* in 1886, lies about 2 miles, 135°, from False Islet.

Bushmen River, 2¾ miles northeastward of False Islet, is choked at its mouth by sand and rocks, but at high tide the water runs in. Its southern point is a high cliff with three lumps on it, connected with the main beach ridge by a neck of sand, against the background of which the dark rock shows out conspicuously.

Karega River.—Between Bushmen and Karega Rivers the beach ridge is about 180 feet in height, covered with bush and partially faced with sand; the entrance to Karega River is generally open at high water. Patches of rocks, some awash at low water, extend from Bushmen River to beyond the mouth of Karega River, the outer one lying 1,600 yards, 123°, from the river mouth; the sea breaks for a considerable distance outside these patches.

Kasuga River.—For 2 miles northeastward of Karega River the shore is fringed with rocks, some sunken, extending 400 yards; the coast ridge rises to a height of 225 feet, and at 3 miles from Karega River is Kasuga River.

Ship Rock, a black rock 50 feet high, lies close inshore about 3 miles east-northeastward of Kasuga River; the coast ridge is about 400 feet high, and sand extends up the face of the hills, against which Ship Rock shows conspicuously. From Ship Rock to Kowie Point, a low projection, the beach is fringed with rocks; at 1,400 or 1,600 yards westward of Kowie Point and a short distance from the coast are two sunken rocks.

Glendower Peak.—At the back of the beach ridge, nearly 2 miles northeastward of Ship Rock, is Glendower Peak, a high grassy head, 622 feet above the sea. It is tolerably steep on both sides, its western side dropping to a small stream, which, having no outlet, soaks through the beach ridge.

Beacon.—A pyramidal stone beacon, 50 feet high, the upper part black, lower part white, stands on Glendower Peak, in order to afford a distinguishing mark on this monotonous coast.

Salt Vlei Bay.—From Kowie Point, the shore trends northeastward about 1½ miles to Salt Vlei Point, westward of which is Salt Vlei Bay, having a sandy beach fringed with rocks on both sides of it. On the western side of the bay are Peak and Black Rocks, 2 and 3 feet high, respectively, and nearly 200 yards offshore.

The land is low and grassy in the bay and ¼ mile inland is a farmhouse, and on a small hill to seaward of the house is a flagstaff. Salt Vlei Point, on the northeast side of the bay, is low and rocky, with shore bank, under 3 fathoms, extending about half a mile eastward of it. Within the beach a ridge of hills, extending to Kowie River, vary from 60 to 140 feet in height and are covered with bush. The highest part is near the river, to which it drops abruptly.

Kowie River, rising near Grahamstown, 40 miles from its mouth, is navigable by small vessels for about 5 miles and by boats for upwards of 16 miles. The scenery is exceedingly beautiful and picturesque, the banks being wooded to the water's edge and varied, in the upper reaches above Mansfield, by grassy slopes and high steep cliffs. Game is abundant and fish may be caught in the river and near the Fountain Rocks off the entrance.

The river runs close between two stone embankments, terminating in piers constructed of concrete blocks and forming the entrance to Port Alfred.

Port Alfred is formed by the outlet of the Kowie River, and on each side of the entrance is a pier, the western, extending from the western point of entrance to the river in a direction 118° for a distance of about 1,050 feet, while the eastern, from the opposite point of entrance, projects about 124° for 600 feet, leaving an entrance between them nearly 200 feet in width. Within, for a distance of about 1½ miles, the river has embankments on either side, that on the eastern being 7 feet above high water.

Port Alfred has ceased to be a port so far as shipping is concerned, and all facilities have been removed.

Signal staff.—Immediately within the root of the western pier is the port office signal staff.

Beacons.—Two beacons, for use in crossing the bar, are situated on the western side of the river, about ½ mile within the entrance; the outer is red and formed of two poles with crossbars, surmounted by a pole and ball.

The inner beacon, near Mount Cocks House, is a white flagstaff, standing 298°, distant 176 yards, from the outer beacon.

Bar.—The bar, formed by shore bank under 3 fathoms, consisting of a deposit of sand on rock, has its outer edge about 200 yards southeastward of the west pierhead; the deposit of sand is increased by the heavy swell sent in by westerly and southwesterly winds, this often rendering the bar impassable for two or three days, but the scour of the ensuing spring tides clears the channel, although this latter is subject to considerable alteration both in direction and depth.

Depths.—The 5-fathoms contour line is about 600 yards outside that of 3 fathoms, but a short distance within the former and immediately southwestward of the leading marks, is a shoal of 3¾ fathoms, which sometimes breaks; on each side of the entrance the 5-fathoms contour is nearly 1,600 yards from the shore, with no shoals outside it, except Jansens Rock, on the east side.

The least depth on the line of the leading marks, outside the piers, is 1¾ fathoms, decreasing to 1 fathom about 200 yards within the entrance points to the river.

Dangers.—**Fountain Rocks**, on the east side of the approach to the river, cover a space about 800 yards square, with patches of 3 fathoms about 200 yards eastward and westward of this; some of the rocks are awash at high water, while others uncover at half tide, the sea always breaking on the outer patches, and these have depths of from 5½ to 8 fathoms close-to. The southwesternmost patch, always breaking, lies 93°, distant nearly 1 mile from the west pierhead.

The quarries, on the east bank of the river, at about 1 mile within the entrance, open westward of old Customhouse Point, bearing 303°, leads southwestward of Fountain Rocks.

Jansens Rock, awash at low water, lies 700 yards eastward of the eastern dry rock of Fountain Rocks; there are depths of from 4 to 5 fathoms close northward and eastward, and 9 fathoms seaward, of the rock.

A gap in the cliffs near the outlet of the Rufane River, bearing 358°, leads eastward of both Fountain and Jansens Rocks.

Directions.—From the westward the position of Kowie River may be known by Glendower Peak and beacon, the adjacent country consisting of smooth grassy slopes dotted with bush and fronted by a line of sandy hillocks; from the eastward, the Black Rocks or Three Sisters, 7 miles eastward of the river, will be a guide, and the houses and flagstaffs will point out the position of the entrance.

When about 2 miles from the bar Mount Cocks flagstaff should be brought in line with the red beacon, bearing 298°, which will lead to the anchorage.

In case of putting to sea it should be remembered that at from 5 to 25 miles offshore the Agulhas Current sets westward frequently at the rate of 80 or 90 miles a day, and that moderate shelter may be found under the Bird Islands in Algoa Bay. Also that by keeping within about 12 miles of the shore the very heavy sea caused by that current at a greater distance offshore will be avoided.

Anchorages.—The outer anchorage, in depths of from 15 to 17 fathoms, over sand and good holding ground, is with the river entrance open, and the port office signal staff, bearing 305°; elsewhere the holding ground is indifferent.

The inner anchorage, in a depth of 8 fathoms, ½ mile closer in, is not so good as the sea breaks at it in bad weather, and at either anchorage a vessel should have a strong coir spring to ride by, and having veered to 70 or 80 fathoms, be prepared to leave immediately signals are made from the port office regarding the approach of bad weather.

Signals.—The following local signals are made for the guidance of fishermen:

1. Red flag in center of East Yardarm: Fishing boats can leave, but not enter the river.

2. Red flag dipped: No fishing boats may go out; those outside must return at once.

3. Blue flag over red, dipped: Do not attempt to enter, wait for turn of tide.

4. Blue flag below red, dipped: Enter, but exercise great caution.

Life-saving station.—A rocket apparatus is maintained at Port Alfred.

Tides.—It is high water, full and change, in Kowie River, at 3 h. 50 m.; springs rise 4½ feet, neaps rise 3 feet. The tides are influenced by the winds, varying from 6 inches to 1 foot, and being lower with easterly, and higher with westerly winds.

No tidal stream is appreciable at the roadstead, but it is felt about 12 miles up the river.

Wind and weather.—The prevailing winds in summer, in the immediate neighborhood of the port, are easterly and southeasterly during the day, calms and light airs off the land by night, but occasionally a strong southeaster blows continuously for two or three days and nights.

During the winter westerly winds with bad weather occur at times, but a gale may be blowing in the offing when it is fine near the coast.

Town.—Port Alfred, a small seaport town, and one of the favorite watering places of the colony, is built on both sides of the Kowie River; it is a great holiday resort, and has a population of about 12,000.

Communication.—There is railway communication with Port Elizabeth, via Grahamstown, the line joining the Midland system at Alicedale Junction, and a connection with the coast line from Port Elizabeth is projected, making a shorter route to that place; telegraphic communication with all parts.

Supplies of fresh provisions may be obtained, but water is scarce and indifferent in quality. Fish may be caught in the river and near the Fountain Rocks.

Climate.—The warm Agulhas Current, running down the coast from the southern tropic, moderates the winter cold, and frost is almost unknown; it is thus rendered a genial resort for invalids.

Coast.—From Kowie River the sandy beach, trending east-northeastward for 6 miles to Riet Point, is low, sandy, and in places fringed with rocks; the hills, at ½ mile inland, range from 230 to 350 feet in height, and are backed by hills about 350 feet high, faced with sand in places. At 1 mile westward of Riet Point, behind the coast ridge, is a hill 486 feet high, which, seen from either eastward or westward, is conspicuous.

Rufane River, 2 miles eastward of Kowie River, has its mouth closed.

Riet (Reed) Point, low and sandy, has sunken rocks extending at least 800 yards off it, and 400 yards off the coast at ½ mile westward of it; the sea breaks for a considerable distance off the point. Riet River discharges into the bight eastward of the point.

Dangers have been reported to extend about 3½ miles off Riet Point, and, in 1907, a vessel, striking an obstruction, foundered at 2½ miles off it, therefore it would be advisable to give it a berth of about 4 miles; Glendower Peak Beacon bearing 259°, leads nearly 1 mile seaward of the charted reef, and the same beacon about 277° should lead 4 miles off.

Black Rocks or Three Sisters, connected with the shore by a narrow neck of land, show conspicuously like an island against the white sand behind; the central rock is 50 feet high, and on their sea side they are nearly perpendicular. Sunken Rocks extend from 600 to 800 yards off Black Rocks, and off the point eastward of them, beyond which the sea breaks for some distance.

Kleinemond Rivers, situated about 1 mile eastward of the Black Rocks, have sandy mouths, generally closed, and are separated from each other by a narrow strip of land; they traverse a low country, covered with grass and patches of bush.

Coast.—From Kleinemond Rivers the coast trends 3½ miles east-northeastward to Great Fish Point, with bushy hills near the sea, faced with sand nearly to their summits, and, at 2½ miles from Kleinemond Rivers, these attain their greatest height of 307 feet in Palmiet Hill.

Great Fish Point is low, sandy, fringed with rocks, and a short distance within it the coast hills rise to a height of 260 feet; a rock showing at low water, with 12 fathoms at 600 yards outside it, lies nearly 1,000 yards off the point. About 1,600 yards northeastward, and 500 yards offshore, is a half-tide rock on which the sea breaks.

Light.—On a prominent hill ½ mile northward of the point is an octagonal tower, 30 feet in height, with black and white bands, which exhibits, at an elevation of 278 feet above high water, a white flashing light; it should be visible in clear weather from a distance of 23 miles.

Coast.—Little Fish Point, about 1½ miles northeastward of Great Fish Point, is rocky and shelving, the hill over it being 140 feet high, covered with bush, and partially faced with sand.

Great Fish River, 2½ miles northeastward of Great Fish Point, is always open at its mouth, but the sea generally breaks across the entrance, the depth in which is not known and probably is not permanent. Entering it at any time must be attended with considerable danger.

From seaward the course of the river shows as a perceptible gap in the coastline, its position being also known, in clear weather, by distant hills of an undulating form, which bear about 310° when in line with the ravine through which the river flows.

At Rocky Head, the eastern point of entrance, are three dark rocks 25 feet high, outside and around which are several other rocks showing at low water and extending 300 yards in places. The sea breaks for some distance outside these rocks.

At 600 yards within Rocky Head is a bushy peak 102 feet high, and near its base is the narrowest part of the channel, which, about 20 yards wide, appears deep for a width of about 10 yards. The sea does not break continuously, there being at times an interval of about 5 minutes when a boat might effect a landing, but when a break occurs it does so with much greater violence than that of the constant rolling surf along the sand fronting the river's mouth.

At certain seasons the river rises considerably, when the stream becomes too strong for small craft to enter, but at other times it is a mere brook, and the stream is then inconsiderable.

Current.—The water of the Great Fish River is of a red color and may be traced after rain for some miles westward of Kowie Point but is seldom seen eastward of the river. From this fact it is evident that an east-going current near this part of the coast, though occasionally experienced, is not of frequent occurrence.

Waterloo Bay, included between Great Fish River and Stalwart Point, about 4 miles northeastward, has hills rising steeply from the beach to from 180 to 250 feet and faced with sand nearly to their summits, which are covered with dark bush. Two streams run into the bay, but both their mouths are closed with sand.

In the center of the shore of the bay, about 2 miles northeastward of the Great Fish River, a ledge of rocks projects about 400 yards from the beach, with, at 200 yards off its eastern extreme, a sunken rock.

Temporary anchorage.—The anchorage in the bay, which can only be considered as temporary, is very much exposed with southeast winds, and vessels should always be prepared to leave it. Vessels should not anchor in a less depth than 9 fathoms, with Great Fish Point bearing 234° and the southwestern end of the rocks, about ½ mile northeastward of Great Fish River, 340°; rollers occasionally set in even during calm weather, rendering it very unsafe. There is better anchorage in a depth of 14 fathoms, with good holding ground, over coarse sand, but this is at too inconvenient a distance for landing.

Landing was formerly effected by means of surfboats in the bay between the rocks off the eastern point of Great Fish River and those to the northeastward of them, but even then it was difficult, considerable strain being brought on the surf lines by the west-going current.

Tides.—It is high water, full and change, in Waterloo Bay at 4 h. 0 m.; springs rise about 6 feet.

Stalwart Point.—The hills within Stalwart Point are 377 feet high, and some farmhouses are visible from seaward; a shoal which stretched about 1,600 yards southeastward of the point is apparently extending seaward, and in 1908 a vessel struck an obstruction 2 miles distant from the point, which latter should be given a wide berth by passing vessels.

The shore northeastward of the point is fringed with a series of ledges extending 400 to 600 yards from the beach, with sunken rocks a short distance off.

Coast.—From Stalwart Point the coast, trending northeastward is almost a straight line, for a distance of 43 miles to the entrance of the Buffalo River, has few irregularities, no anchorages affording any shelter, and no off-lying dangers; several streams, but none of any importance, run into the sea on this stretch of coast.

The Impekquina River, about 2 miles north, northeastward of Stalwart Point, is generally closed at its mouth, and a little westward of it is a dark bushy head 144 feet high and partially faced with sand, behind which, ¼ mile inland, a house is visible from seaward. The Umtata River, a little farther northeastward, has an entrance generally open, and the coast between is fringed with ledges extending some distance from the beach, the sea breaking a long distance outside them.

A hill on the western side of Umtata River is 260 feet, and one on the eastern side 149 feet high, the latter covered with dark bush and faced with sand a short distance up; a sunken ledge extends 500 yards from the latter hill. Golana River, 1 mile farther northeastward, is closed at its mouth; the beach for about halfway is fringed with rocks, with a detached rock lying 400 yards off its eastern point.

Bequa River, 3 miles northeastward of Golana River, is generally closed at its mouth, and the beach between is fringed with ledges, extending nearly 400 yards from the shore, with sunken rocks beyond. The coast ridge rises steeply from the beach, and gradually increases in height as Bequa River is approached.

Madagascar Reef, about 1,400 yards in length, dry at low water, and with 12 fathoms at 400 yards outside it, lies ½ mile offshore, and the same distance northeastward of Bequa River; the sea always breaks over the reef.

Coast.—Gosha River, another inconsiderable stream, apparently closed at its mouth, is about 2 miles northeastward of Bequa River, the shore between being a sandy beach, and, midway, fringed with rocks. From thence northeastward to Keiskamma Point the beach is sandy, fringed with rocks, and broken by two or three small rivulets. The coast ridge is partially faced with stand, varying in height from 40 to 70 feet, the land immediately behind rising to a height of 300 feet, and about ½ mile westward of the point forming a head, on the summit of which a house is visible to seaward.

Keiskamma Point, low, sandy, and fringed with rocks, has a bushy-topped sand hill, 110 feet high, near its extreme, which, when seen from the westward, near the coast, appears like an islet.

Rock.—At 1 mile southwestward from Keiskamma Point, and 600 yards from the shore, is a rock which shows at low water, springs; the sea breaks heavily here in bad weather.

Keiskamma River, about 1 mile northward of Keiskamma Point, is about 100 yards wide at its mouth, at low water, and within the river opens into a basin about 1 mile in extent, partially dry at low water; the main stream trends northwestward from the basin, and has its source many miles in the interior, draining a large tract of country.

In fine weather boats sometimes enter and leave the river in safety, but such an occurrence is infrequent, and it is always attended with danger, as no dependence can be placed on the bar, the depths on which are constantly altering; in bad weather the surf extends a long ½ mile from the shore. On the western bank of the river are Hamburg and Bodiam, two German villages, the former about 1 mile, and the latter 5 miles, from the entrance.

About ¼ mile northeastward of the entrance, and about 200 yards offshore, some rocks show at low water, and 1½ miles south-southeastward is a 10-fathom patch.

Coast.—Between Keiskamma Point and Buffalo River the coast is covered with grass and bush in patches, and intersected by streams and deep ravines; it is backed by an irregular ridge of coast hills, covered with dark bush, and faced at intervals with sand. About 6 miles inland the hills rise to heights of from 600 to 700 feet, and when well off the coast a range of mountains from 2,000 to 3,000 feet in height, in the vicinity of King Williamstown, may be seen. The range in the vicinity of Grahamstown is also visible.

Near Keiskamma River, the coast is about 600 feet in height, with patches of sand 80 or 100 feet high, showing against the dark land, and its position may at once be known should a beacon, some 12 miles farther northeastward, be seen; it may also possibly be identified by a mountain of conical shape, flattened at the top, standing by itself, with another high mountain a short distance to the eastward, which has three slight elevations. When these mountains bear about 310°, they are in line with the entrance of Keiskamma River.

Caution.—For the whole distance between Keiskamma and Bashee Points, a distance of about 95 miles, vessels should not approach the shore within a distance of 2 miles, nor at night nor in thick weather into a less depth than 40 fathoms.

Coast.—From Keiskamma River the coast trends northeastward about 6 miles to Chalumna River, with several streams between, two of which, like most of the small streams on this coast, are choked with sand; Guanie, the eastern stream, is open at high water.

Chalumna River has a bank, dry at low water, extending across its mouth, and, from 1,000 to 2,000 yards northeastward of it, rocks extend about 250 yards offshore; farther northeastward, the coast is sandy but fringed with rocks as far as the Nieca (Gneka) River, and about 1 mile southwestward of that river, and 700 yards offshore, is a rock which breaks.

The Nieca (Gneka) River is open at high water, but a sand spit extends nearly across from the western point at low water; the eastern point, rising to about 150 feet, is covered with bush. Another stream empties itself northeastward of a low point 2½ miles northeastward of Nieca (Gneka), River; at the northeastern point of its entrance is a bushy peak, 185 feet high.

Beacon.—A black wooden pyramidal beacon, 51 feet in height, standing on an equilateral base and terminating in a sharp point, stands at an elevation of 381 feet on the hill, 1½ miles northward of the mouth of Nieca (Gneka) River; it should be visible in clear weather from a distance of about 23 miles, and serves as a landmark for identifying the coast.

Nkutu (Iqutu) River, 5 miles northeastward of Nieca (Gneka) River, is generally open at high water, and at 1 mile inland is a bushy hill, 414 feet high, with a house visible from seaward near its eastern part halfway down its face; a sunken rock lies 700 yards southeastward of the river entrance.

Gola River, 2½ miles northeastward of Nkutu (Iqutu) River, is also open at high water; the shore between is fringed with rocks, and the coast hills covered with bush faced with sand. The hill at the western point of Gola (Igoda) River is about 120 feet high and covered with bush, the sand extending some distance up its face.

Gola (Igoda) Point, on the eastern side of the river, projects somewhat and rises precipitously to a rounded grassy summit, 336 feet high; ⅔ mile inland is a remarkable peak, 443 feet high, conspicuous from all directions. At 1¾ miles northeastward of Gola (Igoda) Point is a stream, 700 yards off which is a sunken rock.

Cove Rock, 2½ miles northeastward of Gola (Igoda) Point, is quoin-shaped, 86 feet high, and has a deep notch in the middle; it resembles an island, being only connected with the shore, from which it is about 600 yards distant, by a neck of sand, and forms a good mark when coasting. Off it, and westward of it, at 400 to 600 yards offshore, are some outlying rocks which generally break.

Landing.—Northward of Cove Rock boats may land on a small sandy beach even during southeasterly winds.

Coast.—From Cove Rock, northeastward, the coast assumes a more pleasant aspect; bare sand hills are now only occasionally met with, and they always have such remarkable forms as to be fair landmarks.

From Cove Rock the coast trends northeastward to Hood Point, with several small streams entering between, and is fringed with rocks, but has no offlying dangers.

Hood Point, nearly 5 miles northeastward of Cove Rock, is low and rocky, but rises steeply from the beach to a ridge 107 feet high, covered with grass and bush.

Light.—On the northeastern end of the ridge of Hood Point stands a cylindrical red and white checkered tower 62 feet in height, from which is exhibited, at an elevation of 180 feet above high water, a white group flashing light; in clear weather it should be visible from a distance of 20 miles.

Signal station.—Near the lighthouse is a signal station with which vessels can communicate by the International Code, but only during the hours of daylight.

Buffalo River.—From Hood Point the coast bends round northeastward for 1¼ miles to the entrance to Buffalo River, the 5-fathom contour line extending about ½ mile from it and breaking near its edge in bad weather. Buffalo River, rising in the Amatolas, forms the port of East London at its mouth, above which it is navigable for small steamers for a distance of 4 miles, the banks being steep and in places attaining a height of 200 feet.

Castle Point, the south point of entrance to the river, is low and rocky, with rocks extending nearly 400 yards from it and tending to break the force of the sea against the breakwater, while on the north side of the entrance for about 1 mile the coast is fringed by a ledge of rocks, with detached low-water rocks extending off 200 yards in places.

East London Harbor is formed on the south side of its entrance by a breakwater extending for a distance of 2,100 feet in a direction 76°, which is in course of extension for a farther distance of 500 feet in the same direction. Within the breakwater a pier, about 450 feet in length, projects about 102° from the same point of the river.

On the north side a pier extends for about 1,000 feet 103° from the northern point of entrance.

Lights.—On the end of the north pier a fixed green electric light is exhibited at an elevation of 41 feet above high water from an iron framework 30 feet in height and should be visible in clear weather from a distance of 2 miles.

About 1,400 yards northward of the preceding a fixed red electric light is shown from a white iron column 37 feet in height at an elevation of 64 feet above high water and should be visible from a distance of 4 miles.

Leading lights.—Two fixed red leading lights, for use in entering the harbor, are situated on the south side of the entrance and are nearly 300 yards apart and in line 258°.

The front light is shown at an elevation of 45 feet above high water from a pyramidal tower 37 feet in height, with red and white bands, situated on Castle Point, within the root of the south breakwater, and should be visible in clear weather from a distance of 8 miles. For bearings of obscured arc, see Light List.

The rear light is shown from a flagstaff with an inverted triangle as a topmark.

Fogsignal.—During thick or foggy weather fog rockets are fired at intervals of not less than 10 minutes, in answer to signals from a vessel.

Bar.—Like most South African rivers a sand bank fronts it, forming a bar, which to the 5-fathom contour line extends about 400 yards from the present breakwater end; the surf on it is often dangerous and after continued southwest or southerly winds and heavy seas, the bar has a tendency to shoal, becoming dangerous and sometimes impassable.

Depths.—The depths on the bar vary constantly, but dredgers are continually at work and there is an average depth of from 24 to 25 feet, with less water between the breakwater and the North Pier. A vessel of 24½ feet draft has crossed the bar, also one of 490 feet in length, drawing 22$\frac{1}{12}$ feet, and vessels drawing 18 or 19 feet can enter or leave at all states of the tide.

Harbor.—There are wharves along both sides of the river, extending to about ½ mile from the entrance, which is about 100 yards in width; these wharves have a total length of about 6,000 feet, one of 1,500 feet, on the southwest side, having a depth of 28 feet alongside at low water, and vessels drawing 24 feet can lie alongside others.

Extensive railway sidings serve the wharves on both sides of the river, and connect with the main line of railways. Steam and traveling cranes are capable of lifting up 50 tons, and on the new wharf on the southern side of the river are 13 electric cranes, lifting from 3 to 20 tons.

Proposed harbor works.—The following harbor works are proposed: The extension of the South breakwater for a further distance of 500 feet, and the removal of the pier on the north side, to allow the mouth of the river to be widened to 500 feet. From a position about 800 yards northeastward of the river mouth, a new pier to extend for a distance of 2,200 feet in a direction 167°, thus leaving an entrance between it and the extension of the South Breakwater with a breadth of 700 feet.

Pilots.—Government pilots may be obtained, and pilotage is compulsory for merchant vessels; no stranger should attempt to cross the bar without one.

Directions.—Coming from the westward the beacon, mentioned on page 140, is a good guide to identify the coast, and from the eastward another beacon, about 15 miles to the northeastward, is equally useful in that direction. From the westward vessels should not approach the coast within a distance of 2 miles until nearing the port, when Hood Point Lighthouse, the buildings, flagstaffs, and a bluff 150 feet high on the north bank are all landmarks.

Coming from the eastward, the northeast corner of the barracks open to the low point of east head of the river, bearing 245° leads about ½ mile southward of Nahoon Point and the dangers offshore between it and Inkyanza River.

From the latest information received, the marks for leading over the bar are a flagstaff surmounted by an inverted triangle in line with Castle Point Light Tower (pyramidal, red and white bands), bearing 258°, or, when the deeper water is on the southwest side of the bar two posts surmounted by white disks and situated seaward of the port office are used.

Anchorage.—Good anchorage, with westerly winds, may be obtained in a depth of 12 fathoms, with two flagstaffs, having black and white mastheads and standing near the inner end of the breakwater, in line bearing 253°, Nahoon Point 30° and the breakwater end 248°, or from 400 to 600 yards farther westward, in 10 or 8 fathoms, and the bottom of stiff mud underlying sand, being free from rocks, affords good holding ground, so that in cases where vessels have drifted from the anchorage it has been the result of the cables parting and not from dragging. Vessels should not anchor to the southwestward of the river.

The anchorage is considerably exposed, and vessels generally lie broadside on to the sea, and so roll and strain to a great extent; steam vessels making a short stay may anchor at the inner berth above mentioned, but any vessel running the risk of lying at the anchorage in bad weather should on no account be in less depths than 12 or 14 fathoms. Owing to the shifting nature of the bottom during gales anchors that have been lost are rarely recovered.

Lighters go out to vessels in the roadstead in almost any weather, but vessels whose draft admit are taken into the harbor as soon as possible after arrival at the roadstead, and a copy of the port regulations should always be obtained by them. Sailing vessels anchored in the roadstead and unable to enter the harbor from any cause should put to sea on the approach of a gale, standing to the eastward, if possible, and then heaving-to.

Life-saving station.—Two lifeboats and three sets of rocket apparatus are maintained. The signal J. C. T. by day or two white lights placed horizontally, by night, hoisted at the port office, and repeated at Signal Hill Station, denote that a lifeboat is under way. Signals to a stranded vessel are the same as those at Port Elizabeth.

Signals.—Vessels can communicate with the signal station situated on Signal Hill to the eastward of the entrance, by the International Code, and by semaphore in the daytime or by Morse Code at night. Vessels can also communicate, by the International Code, with the port office, when the signals from the signal station are not discernible.

All port signals must be answered by vessels, and strictly obeyed, and any vessel disregarding them will be reported at Lloyd's, and also to their owners.

General port office signals.—

1. Union jack over S. (white pierced blue): Prepare for bad weather.

2. Union Jack over J. (blue, white, blue, horizontal): Veer cable and put spring on.

3. Union Jack over black ball, J underneath: Veer to whole cable and put spring on.

4. Union Jack over H. (white and red vertical): Heave in cable to same scope as when first anchored.

5. Ensign over black ball: Slip, and put to sea, lee vessels first, to avoid collision, but those that can get away clear do so at once.

6. Black ball at yardarm: Impossible to cross the bar.
(No boat should attempt to cross the bar while this signal is up.)
7. Black ball at yardarm and working flag at half mast: Bar temporarily impassable, waiting improvement.
8. Black ball three parts of the way up: Bar dangerous.

CAUTION TO BOATS WORKING.

When lighters are working, a red flag with a white center, known as the working flag, is hoisted at the port office flagstaff, but is hauled down when the bar is impassable.

By night, when boats are working, the following lights will be exhibited seaward from the port office:

A white light: Bar passable.
A green light: Recall for lighters, bar uncertain.
A red light: Bar impassable, stop outside.

Landing.—Steam launches and tugs are always available for landing and embarking passengers. Ships' boats should on no account attempt to cross the bar, even in the finest weather.

Tides.—It is high water, full and change, in Buffalo River at 3 h. 47 m.; springs rise 5½ feet, neaps rise 3¾ feet. For the information of the pilots the rise of tide is shown by signal from the port office.

Tidal streams.—The in-going tidal stream sets across the bar and into the river at a rate of ¾ knot: the outgoing stream has a velocity of about 1¼ knots.

Current.—At the anchorage off East London the current generally runs southwestward at from 1 to 2½ knots, but in calm weather or during strong southwesterly winds the surface water is retarded and occasionally runs eastward about ½ knot or even more.

Inshore, near the edge of the breakers, an eddy current frequently runs eastward; this current varies in strength, but seldom attains a rate of ½ knot. In the offing, at about 15 miles from the coast, the regular Agulhas current runs steadily southwestward at rates of from 2 to 4 knots.

Wind and weather.—Observations show that of the winds blowing along the land, northeast and southwest winds are fairly equal during the winter months; but from August to March southwest winds exceed northeast winds in the proportion of about 3 to 2. Of those that blow directly landward comparatively few are recorded, whilst those from off the land, between north and west-northwest, greatly preponderate during the winter months. The well-known black southeaster is the most dangerous wind at East London.

Gales.—The weather near East London presents a marked difference to that on any other part of the coast. When the mercury commences to rise on the wind shifting to the westward the crisis is accompanied by lightning, thunder, and heavy rain. If the wind shifts suddenly southwestward in a squall, with a rapidly increasing barometric pressure, a fresh gale may be expected, with fine weather, which will continue until the mercury rises to about 30.4 inches.

If the barometer remains low and steady a strong gale from west-northwest may be expected, probably lasting several days; but if the wind shifts slowly to southwest, the barometer rising slowly with drizzling rain, a strong gale and high sea may be looked for.

In such a case the wind begins to blow hard from about west, and veers slowly southwestward until the mercury stands at about 30, the sky becomes leaden, thick, drizzling rain sets in, and the mercury oscillates between 30 and 30.10, the temperature being considerably below the average.

In June, July, and August these much-dreaded southwesters often follow unsettled weather, preceded by moderate to fresh easterly breezes and a falling barometer. They blow with considerable violence and have caused many disasters to shipping in East London Roads.

From October to April easterly winds are the most prevalent, and southeast gales may be expected.

Rollers, seldom setting in during the summer months, are frequent during the winter, and generally break in about 3 fathoms, in stormy weather in 5 fathoms, and sometimes even in 7 or 8 fathoms.

Town.—The town of East London, standing on a wide plateau, on both sides of the river, at an elevation of about 200 feet, has its two portions, known as East London east and west, connected by a bridge. In 1913 the population was 23,500.

Communication.—There are regular services of mail and intermediate steamers of the Union Castle Line, while other British, and occasional foreign, steamers run between East London and Europe, America, and India.

East London is the coastal terminus of the eastern division of railways, the main line being 286 miles in length to Bethulie bridge, with branches to Cookhouse via Blaney, to Idutywa via Amabele, to Tarkastad via Bowkers Park, to Maclear via Sterkstroom, to Aliwal North via Albert Junction, and a branch from Aliwas to Lady Grey and Motkop. A number of extensions are authorized.

There is telegraph communication with all parts.

Coal and supplies.—About 4,000 tons of coal are kept in stock, and a large quantity could be obtained from the pits in 48 hours. Besides this supply, about 37,000 tons are imported annually. Coaling is carried on by bags and baskets, and 2,000 tons could be put on board in 24 hours, or in a case of emergency 3,000 tons. There are 18 lighters, each holding 125 tons; also coal wharves 200 and 75 feet in length, with a depth of 18 feet alongside. Southeast and southwest gales would interfere with coaling at the roadstead.

Fresh meat, vegetables, and bread are good and plentiful, and good water can be obtained from the municipal reservoir, supplied by the harbor board. It is laid on to the wharves, and a tank boat supplies vessels in the roadstead.

Patent slip.—A patent slip is situated on the southwest side of the river.

Repairs.—Large repairs to machinery can be effected by the harbor authorities, and any kind of repairs can be made to the hull of a vessel of 1,000 tons; steam and electric cranes lift up to 50 and 20 tons, respectively, and there are small steam hammers.

Hospital—Sailors' home.—A hospital and a sailors' home are maintained.

Time signal.—A time ball, situated on a 149-foot hill about 200 yards southward of Signal Hill, is dropped by electricity from the cape observatory at 0 h. 0 m. 0 s., standard time of the Union, corresponding to 10 h. 0 m. 0 s. Greenwich mean time; should the signal fail in accuracy a yellow flag is hoisted for a short time after the ball has dropped. The signal, which is not made on Sundays or public holidays, is visible to vessels alongside the wharves.

Life-saving stations.—There are two life-saving stations, one 600 yards eastward of the river mouth and the other at the port office.

Trade.—In 1912 the exports were valued at $9,771,617 and the imports at $21,654,000.

Coast.—Nahoon Point is about 2½ miles northeastward of Buffalo River, and midway is Inkyanza River, where there is a sandy beach, the remainder of this stretch being rugged cliffs, from 20 to 50 feet high; no sunken dangers exist beyond a distance of 400 yards, but the sea breaks at 600 yards from this coast, which should be given a wide berth.

Landing.—Between East London and Bashee River the coast is everywhere fringed with rocks and by a continuous heavy surf, so that very few places offer any chance of successful landing even in the most favorable weather. Of such exceptional places the following two may be mentioned:

About ½ mile northward of Nahoon Point is a small sandy bight, where it is said landing might be effected in westerly gales in case of emergency, and at Gonubie Point, on the southwestern side of the bight, landing might at times possibly be practicable.

Nahoon (Kahoon) River, about ⅔ mile northward of Nahoon Point, is generally open at high water, and the tide is appreciable for about 3 miles up. The western point of the river is a bushy peak, 80 feet high, and partially faced with sand.

Life-saving station.—A complete set of life-saving apparatus is kept at Nahoon Point.

Danger Point, 2 miles northeastward of Nahoon River, is low, sandy, and fringed with rocks, and midway between these is Gonega (Quenera) River, a small stream; the highest part of the coast hills, 210 feet above the sea, is behind Danger Point, the sand extending up to the summit. Between Danger Point and Gonubie Point, 3 miles northeastward, are the Klakla and the Ganindugs streams.

Reef.—A reef which dries 1 foot, with 11 fathoms 400 yards outside it, lies 800 yards southward of Danger Point.

Gonubie Point and River.—From Gonubie Point, a ledge of rocks extends westward ½ mile, and about 400 yards offshore; in bad weather, the breakers extend 600 yards off, with uneven bottom beyond. Gonubie River, ½ mile northward of the point, is open at high water, the tide running up about 3 miles.

Coast.—At 2 miles northeastward of Gonubie River is a bushy peak 242 feet high, inclining to the eastward, which, from its peculiar shape, is one of the conspicuous objects in the neighborhood; a dome-shaped peak is situated about 3 miles farther northeastward.

Kwelegha Point is low and rocky, and ½ mile northward of it is the Kwelegha River, the mouth of which is open occasionally; at 1 mile northeastward is Bolegha (Buligha) River, also open at times. On the western bank of Bolegha River is a bushy hill, 237 feet high, faced with sand a short way up.

Reef Point, 4 miles northeastward of Kwelegha Point, has two rocky horns, at the back of which is a sandy beach, with hills rising to a height of 313 feet. At 500 yards off the point is a ledge of rocks showing at low water; the sea breaks fully ½ mile off the point.

Beacon.—To distinguish the monotonous coast when approaching East London from the eastward, a black wooden pyramidal beacon, 52 feet in height, surmounted by a ball, stands on a hill 1 mile inland and 368 feet above the sea, between Reef Point and Kintza River, 15 miles northeastward of East London; it should be visible in clear weather from a distance of 21 miles.

Coast.—Cape Morgan, 30 miles eastward of Buffalo River, may possibly be identified from the southwest and west by the high perpendicular cliffs showing between Ikuko and Sklagha Rivers, and from the eastward by Kei Kop Hill and Snag Rocks; Mazeppa Bay, by a somewhat conspicuous sand hill, and the coast southward of Bashee River by the Udwessa Cliffs.

Between Reef Point and Cape Henderson, 6½ miles farther northeastward, the coast hills are high and faced with sand some distance up; immediately behind, the land rising to from 350 to 400 feet, is covered with bush.

Kintza (Incinsa) and Klefani Rivers, north-northeastward of Reef Point, are closed, and from the latter river the coast turns northeastward to Cape Henderson, with Kwenugha (Kwengura) and Naagh Rivers between; the western point of the latter is a bare sand hill, 130 feet high, and conspicuous from being the last sand hill of note in this direction for nearly 25 miles.

Cape Henderson, rising directly from a rocky beach to a height of 485 feet, is covered with grass, but does not project to any extent beyond the coastline; it presents a dark bluff appearance from seaward, and on that account was probably described as a cape. At 1½ miles east-northeastward of it is a stream, of which the western entrance point is a head 410 feet high, and off a point just eastward is a sunken rock on which the sea breaks in bad weather, lying about 600 yards offshore and 350 yards eastward of Cape Henderson.

Flat Point and the land northeastward for nearly 1 mile is not more than 25 feet above the sea, and grassy, but about ½ mile inland a grassy ridge rises to a height of 356 feet. At 1½ miles northeastward of Flat Point are the Umtwendwe and Nukwana, two small streams, and farther on the coast becomes much higher and trends gradually northeastward to Ikuko River.

Ikuko or Double-mouth River is generally open, and the tidal stream runs up it about 1½ miles at high water; at 1,200 yards northeastward of Ikuko River and 200 yards offshore are some rocks.

Between Ikuko River and Šklagha River, 2 miles farther northeastward, the coast is irregular and consists of perpendicular cliffs varying from 140 to 220 feet in height; from thence a sandy beach, backed by steep coast hills covered with bush, extends nearly to Cape Morgan, with rocks in places at from 600 to 800 yards offshore.

Discolored water, about ¼ mile in extent, and reported to exist about 3 miles south-southeastward of Flat point, may indicate the position of a shoal.

Rock.—A rock, the position of which is doubtful, was reported in 1906 to lie rather more than 2 miles southeastward of the entrance to Ikuko River.

Cape Morgan, a broad, low rocky point, rising abruptly a short distance inland to a height of 275 feet, and at ½ mile to 395 feet, shows from seaward as a flat-topped hill covered with bush, and at ¾ mile northward of it is Ikwili River, of no importance and with its mouth closed. Northeastward as far as the Kei River the beach is fringed with ledges extending 200 yards off.

Dangers.—A rock with less than 1 fathom over it, on which a vessel was wrecked in 1910, is situated 1.7 miles southward of the summit of Cape Morgan, and several dangers are reported to exist in this locality, while rocks, some above water, extend 700 yards westward of the same cape.

Seaward of these latter rocks are two shoal spots, 400 yards apart, the breakers on the western spot being 1,300 yards west-southwestward of the cape, but the eastern spot seldom breaks.

Anchorage.—Shelter from northwesterly and westerly winds may be obtained at from 1,000 to 1,600 yards northeastward of Cape Morgan and the same distance offshore, and under favorable circumstances landing might be effected.

CHAPTER V.

KEI RIVER TO CAPE CORRIENTES.

Kei River, a dangerous and rapid stream rising in the Storm Bergen Mountains and entered 1¾ miles northeastward of Cape Morgan, has a bar on which the probable depths are from 6 to 7 feet at low water, but it is scarcely ever passable, as breakers extend about 1 mile eastward of the entrance, inside of which it is only 25 yards wide at low water; it then opens to a width of 700 yards, but about 6 miles up it narrows to about 250 yards and its course becomes very sinuous, the land on either side being 500 feet high in places.

On the southern side of the river and 4½ miles inland is Kei Kop, a round-topped hill 865 feet in height, which may be seen from most directions, being the highest hill in the neighborhood. The tidal influence extends about 2 miles above this hill, and here the river is sometimes sufficiently shallow to ford, but the wagon drift is about 20 miles farther up the river.

Snag rocks, one of them 10 feet high, lie from 1,000 to 1,600 yards off the mouth of the Kei River, and sunken rocks, most of which are visible at low water, springs, extend nearly ½ mile northeastward from the snag rocks. The sea breaks heavily all round these rocks, and in bad weather the breakers extend from 400 to 600 yards outside them.

Bar—Depth.—In consequence of the shifting nature of the channel and of the depth varying after gales or floods, strangers should not attempt to enter the Kei River. When examined in 1858 the channel was close to a ledge of sunken rocks extending from the northern shore, the depth on the bar being probably not less than 6 or 7 feet at low water.

Directions.—If attempting to enter the river, in a case of necessity, the above ledge of rocks, over which the sea breaks heavily, should be watched for an opportunity to offer, pulling in when this occurs, and keeping the rocky shore so close as to leave just sufficient room forthe oars. During heavy rollers the breakers on the bar extend to the rocks, when, of course, the channel is impracticable.

Landing.—If landing is necessary and the bar is impassable, it may possibly be effected at a sandy pit, sheltered to some extent by a patch of sunken rocks southward of it; these rocks, over which the sea breaks, lie 200 yards off-shore at three-quarters of a mile southwestward of the Kei River.

When attempting to land on the spit with the in-going stream, and while waiting for a smooth, care must be taken that the boat be not swept too far northeastward, as it has been found that a boat, swamped in the endeavor to pass through the surf, was not thrown on the spit by the rollers but carried northeastward by the in-going tidal stream into the breakers on the bar, and from thence into the river through the channel, not being recovered for a considerable time.

Equal care is necessary during the outgoing stream that a boat be not drifted to the southwestward, where the surf is much heavier and the beach rocky.

Landing in surfboats is sometimes practicable in the sandy bay 1½ miles northeastward of Kei River, and also on the beach near Kologha River.

Anchorage.—There is temporary anchorage off the river, eastward of the snag rocks, in depths of from 10 to 16 fathoms, but it is not recommended.

Tides.—It is high water, full and change, at the Kei River, at about 4 h. 0 m.; springs rise about 5 feet.

Tidal streams.—The stream during the rising tide sets northeastward close inshore, and the other stream southwestward. At 1 mile off the Kei River the current sets southwestward with a velocity of about 1½ knots.

Coast.—The only sand hills for 100 miles northeastward of the Kei River are a sandy bluff at Sandy Point and a similar one 18 miles farther northeastward. Between the Kei River and these sandhills, the coast is covered with grass and bushes down to the beach.

Koko River, ½ mile northeastward of Kei River, has its mouth generally closed at low water, and from the Kei River the beach is fringed with rocks; with the exception of a bushy hill, 110 feet high, on the eastern side of the Koko River, the coast is low and grassy.

Kologha River, 600 yards wide in the entrance, is open at high water, the channel being close to the southwestern point; a sand spit extends from the northeastern point nearly across the entrance. From 1 mile south-westward of Kologha River to 4 miles northeastward of it, the coast is grassy and covered with small hillocks about 10 feet high, formerly ant hills, over which stunted bush has grown; when 4 or 5 miles distant, these hillocks are a conspicuous feature on this line of coast.

At 800 yards southward of the western point of Kologha River is a sunken rock, and at 200 yards westward of it is the eastern end of a ledge 1,000 yards long, which uncovers at low water. Eastward of the sunken rock just mentioned is another lying 400 yards south-southeastward of the western point of Kologha River.

The beach is fringed with rocks for the next 3 miles eastward, as far as the Kobinnaba River, and at 500 yards southwestward of that river is a sunken rock on which the sea breaks.

Kobinnaba River is always open, and the tidal stream runs up about 3 miles, where there is a ford; off the extreme of the eastern point is a rock visible at low water. About ¾ mile eastward of the river is Kobinnaba Point, with a hill 300 feet high within it. Several low-water rocks lie off the point.

Nxaxa River, generally open, has a low western point of entrance, with a reef extending 200 yards off it in an easterly direction, close to which is the narrow channel into the river. The northeast entrance point is a sand hill covered with bush, with a sandy spit extending nearly across to the western side.

The coast hills, rising precipitously from the sandy beach, form a ridge covered with dark bush and faced with sand to some height, and these extend from Nxaxa River to about ½ mile beyond Sandy Point, on which are four distinct peaks, the third from the westward, 280 feet high, being the highest.

Bowkers Bay, northeastward of Sandy Point, is a bight into which a stream discharges.

Anchorage.—The British naval vessel *Active*, in 1878, found good anchorage, with shelter from westerly winds, in a depth of 10½ fathoms, over sand, 1 mile off the stream, and the bay being examined under favorable circumstances it appeared to afford the best anchorage on this part of the coast, and certainly the safest place for landing.

Landing.—Fronting the stream, landing was effected in a whaleboat manned by boatmen from Port Elizabeth, but the surf broke in a depth of 3 fathoms abreast of the landing place.

Coast.—Umfani River is 1¼ miles northeastward of Bowkers Bay, and about 700 yards farther is the Istamfoona River, both rivers open at high water. Between these rivers is a rocky point, behind which is a bushy peak, 255 feet in height, appearing in some directions as a double summit; sand extends about 40 feet up its sea face. At 600 yards southeastward of the mouth of Umfani River is a sunken rock which frequently breaks.

Stony Point is nearly 1 mile northeastward of Istamfoona River, the coast between being fringed with rocks to a distance of 200 yards; the point is low, with a rock 6 feet high at 100 yards and rocks extending 200 yards off it, while two breaking patches lie southward of the point, the outer ½ mile distant from it.

Obstruction.—An obstruction, on which a vessel struck, was reported (1913) to exist at about 1¼ miles southeastward of Stony Point.

Coast.—Between Stony Point and the Manubie River is the Umtilwane River, the mouth of which is nearly closed; the shore between is low, with a rocky beach, skirted with rocks.

Manubie River, open at high water, has a spit of sand extending nearly across its mouth, the channel being on its western side. At the western point of entrance the land is 95 feet high and covered with bush; the eastern point is low, being the extreme of a ridge of beach hills which rise abruptly. At 800 yards eastward of the Manubie River are several rocks about 200 yards from the shore, and about 1½ miles northeastward of the same river is the mouth of the Kleena, which is open at high water.

Mazeppa Point, close eastward of Kleena River, the shore between being fringed with rocks, may be identified by a grassy peaked islet, 26 feet high, lying about 10 yards off it, but there are no dangers, although the sea breaks some distance off in bad weather.

Mazeppa Bay, between Mazeppa Point and Kogha River, sometimes allows cargoes to be landed from small vessels in very fine weather, but with great difficulty; the best place is on the beach just eastward of Nebbelelli River, but in bad weather rollers set in right across the bay. A path runs from the western side of this bay up the ridge, through the Manubie forest, and continues up the ridge to the Natal Road, about 30 miles from the coast, joining it a few miles eastward of Butterworth mission station.

The Nebbelelli River, discharging into the center of the bay, is open at high water, and from its rocky eastern point a ledge dries out 200 yards to a patch of rocks; from this point a sandy beach commences and continues northeastward for about ¼ mile, when the shore again becomes rocky.

Kogha River, 2 miles northeastward of Mazeppa Point, is always open, and has a sandy spit extending nearly across its mouth from the western point, the land over which is 150 feet high and covered with bush. The eastern point, also bushy, is 87 feet high, and from its base a rocky point extends southwestward, with a low-water rock about 100 yards from its extreme.

Its banks are high and in many parts perpendicular, and on the right bank, about 3 miles from the mouth, the Manubie Forest commences, extending about 2½ miles northwestward, nearly parallel to the river, and is about 1 mile in width; the river is tidal for 4 or 5 miles from its mouth.

At 800 yards northeastward of Kogha River and 1¼ offshore is a ledge of rocks 3 feet high, and two-thirds of a mile northeastward of the river, is a low rock point with a sunken rock 150 yards off it; in the bight between are several low water rocks.

Juju River, 1½ miles northeastward of Kogha River, is generally open at its entrance; its western point is low and rocky. On the northeastern bank of the river, a short distance from the mouth, is a dark bushy head about 90 feet high, and from its base a sandspit extends nearly across the river, leaving only a narrow channel between.

Coast.—One mile northeastward of Juju River is a stream generally open at high water, and on the extreme of its western point is a green hummock 15 feet high, with a rock 100 yards off. From this stream the shore trends northeastward for 1⅓ miles to Shekleen River, the coast between having sandy hillocks covered with bush and rising to a height of 200 feet at ½ mile inland; nearly midway between these streams, and 150 yards from the shore, are some sunken rocks.

Shekleen River is generally open, the channel running close to the base of a peak, 120 feet high, which drops perpendicularly on the western side of the river; the eastern side is low, with a sandy beach. Between Shekleen River and the point of the same name is a black headland from which the land rises abruptly to a height of 275 feet.

Shekleen Point, about 50 feet high, is connected with the coast ridge by a neck of sand and bush, and when seen from near the coast it makes as an islet. At 1½ miles northward of Shekleen Point is Gnabie River; and beyond it the Kawka River, with the Gnabbakka River 2 miles farther northeastward; between the Kawka and Gnabbakka Rivers the coast is fringed with rocks.

Gnabbakka River, 4¼ miles northeastward of Shekleen Point, has a wide entrance, and its mouth is common to two streams; the eastern stream is the larger, and the tidal stream runs up it about 5 miles. From thence to Gnabbakka Point, about 1½ miles farther, the coast is rocky, attaining a height of from 200 to 300 feet at ⅓ of a mile inland, and is broken by several ravines.

Ingoma River lies about 1½ miles northeastward of Gnabbakka Point, and ½ mile farther is Kabolla River; between the two is a rocky point, the coast being about 170 feet high. From Kabolla River the coast, composed of perpendicular cliffs about 160 feet in height, trends eastward to Udwessa, a dark bluff point, ½ mile northeastward of which the cliffs cease, and the coast, to Amendu Point and River, is fringed with rocks in places.

Amendu Point is a rocky projection with a bushy hillock 25 feet high on it, and on the western side of Amendu Point is a hill 115 feet high; several rocks above water lie near, and a sunken rock lies about 500 yards off the point. Between Amendu Point and Bashee

River, 2 miles northward, the coast hills, covered with bush, are about 60 feet, and are backed by land about 180 feet, high. The Amendu River forces its way to the sea through a sandy spit, which stretches across from the eastern point.

Bashee River.—The entrance to Bashee River is about 600 yards in width, with sandy spits extending from both points, leaving a channel about 50 feet in breadth, with a depth of 2 or 3 feet at low water; within the entrance are sandbanks drying at low water, the channel lying westward of them and close alongshore; above the sand banks the river expands to an average width of 300 yards. The sea breaks for 400 yards or more outside the entrance.

The western point of entrance is low and grassy, but about ¼ mile up the river on the western side is a grassy hill 270 feet high; the hill on the eastern side of entrance is high and covered with bush. The banks of the river are steep and generally free from bush on the western side, but on the eastern side, from half a mile within the entrance, they are covered with thick bush. About 1¼ miles up the river, and ½ mile from the western bank, the dense Udwessa Forest commences, and extends in a westerly direction for about 5 miles, with a width of 1¼ miles.

Beacon.—A black beacon consisting of a timber tripod, 50 feet in height, stands on a round-topped grassy hill, about 150 feet above high water, and half a mile northeastward of Bashee River entrance; it is reported to be very indistinct and probably not visible more than 6 or 7 miles.

Anchorage.—The British naval vessel *Active*, in 1878, found good anchorage off this river in a depth of 10½ fathoms, over sand, with Amendu Point bearing 227°, and the western head of the river 294°. Rollers set in after a strong westerly or southwesterly breeze, occasionally breaking in 6 or 7 fathoms, but generally, off the mouth of the river, in 3½ or 4 fathoms.

Landing is dangerous, and of two attempts made by a boat from the British naval vessel *Active;* in the first case the boat was carried 1½ miles westward to a sandy beach from 1,000 to 1,400 yards northward of Amendu Point, the crew having to return to the vessel, while on the second attempt the boat was capsized, one life was lost, and the remainder of the crew, reaching the shore with difficulty and being unable to return to the ship, had to proceed by land to East London.

Caution.—Before attempting to land in Amendu Bight on this beach, which is about 200 yards in length, the direction of the current, outside the edge of the surf, should be ascertained so as to avoid being set over the rocky ground, which evidently extends from the shore on either side of the sandy beach. The rollers occasionally, without warning, break heavily a considerable distance outside the usual line of breakers.

Bashee Point, about 1 mile eastward of the river, is bushy, with a grass hummock; a rock lies a short distance off it.

Current.—The Agulhas Current off this coast generally sets paralel with the shore, with velocities of from 1 to 3½ knots; it is weak near the shore, and stronger near the edge of the bank of soundings. It almost invariably sets southwestward through all the anchorages between East London and Bashee River, but sometimes, in fine weather, within about 2 miles from the shore, a weak current may be found setting northeastward; this northeasterly set has occasionally been known to extend 7 or 8 miles off the land.

Coast.—Between the Bashee and Umkomass Rivers the coast is fringed with outlying rocks for distances varying from 200 to 1,000 yards.

Hole in the Wall.—About 17 miles northeastward of Bashee River are two rocks about 100 feet high. The southwestern rock is flat-topped, has a natural archway caused by a perforation at the base, and is known as the Hole in the Wall; the northeastern, and higher rock of the two, has a wedge-shaped cleft in the summit.

Whale Rock Point, about 8 miles northeastward of the Hole in the Wall, is 70 feet high and wooded for about 300 yards inland; Whale Rock lies close off the point. The surrounding country is grass land, with the exception of two patches of trees between it and the Umtata River to the westward.

Rame Head, about 10½ miles northeastward of Whale Rock Point, is a rocky point, sloping gradually, with a small rock at its extreme; about 1,600 yards offshore, a little westward of the head, there are depths of from 8 to 10 fathoms. Brazen Head, the summit of which is 809 feet high, is about 5 miles northward of Rame Head, and when seen from the eastward has the appearance of two distinct points, densely wooded, steep, and bold.

Landmarks.—Between Rame Head and Waterfall Bluff, about 32 miles northeastward, the coast is faced with a number of high bluffs, which do not occur on any other part of the coast, eastward or westward, for a long distance. St. John River is about midway in this line of coast, and about 4½ miles southwestward of its entrance, and connected to the shore, is a remarkable Sugar Loaf Rock.

Cape Hermes, the south extreme of Gordon Bay, is a round grass-covered hill, 433 feet in height, with a rock 8 feet high lying 200 yards off it; the north extreme of the bay has a similar hill over it, but of less height.

Light.—About 100 yards westward from the extreme of Cape Hermes, stands an octagonal tower of dark gray masonry, 44 feet in height, with a white lantern, from which is exhibited, at an elevation of 180 feet above high water, a white flashing light; it should be visible in clear weather from a distance of 20 miles. For bearings of arc of visibility, see Light List.

Signal station.—Vessels can communicate by the International Code with a signal station on Cape Hermes.

Landing.—Just within the cape, at the junction of the rocky shore with the sand, is Pauls Cove, where landing may sometimes be effected when the bar of the river is impracticable; if necessary, boats can be dragged from thence along the beach to the river. Should a boat be swamped in the surf, it would be almost impossible for the crew to reach the shore, as sharks are numerous both outside and inside the river.

Close inshore during the ingoing tidal stream, which runs regularly, a strong stream was found setting southward along the sandy shore inside the breakers, and along the rocky shore in the direction of Cape Hermes. This stream should not be forgotten in attempting to land with the in-going stream, for on one occasion it was found so strong that a cutter could barely stem it.

The anchorage, in a depth of 13 fathoms, with Cape Hermes Lighthouse 273°, distant 1,650 yards, and Porpoise Rock 315° was found to be good; but a berth in about 8 fathoms nearer the river entrance would probably be better. No current was experienced at the anchorage.

Gordon Bay, the indentation in the coast northeastward of Cape Hermes, into which the St. John River flows, affords fair anchorage, but is exposed from about east by north, round by south, to west by north.

St. John (Umzimvubu) River, rising in the Drakensberg, is navigable for vessels of 6 to 7 feet draft for about 12 miles, the difficulty being the bar at its entrance. The appearance of the land from off the mouth of this river is so remarkable that it is easily recognized, as, at the entrance, a table mountain, 1,200 feet high, appears to have been cleft to its base, leaving a wedge-shaped gap in the center, through which the river discharges into the sea.

St. John's Gates, the upper part of this tableland, is bare stratified sandstone rock, like Table Mauntain; but, at 200 feet below, a dense forest covers the cliffs to the edge of the river. The gates are 1¾ miles from the entrance of the river, the western gate, 1,239 feet high, being very steep; the eastern gate, 1,163 feet high, has two distinct terraces of tableland with grass on them.

Below the gates the river banks are so steep that small craft may lie alongside them, but above them the bottom is very irregular, with shallow reaches and recurring deep holes, a depth of 56 feet having been found in one place; the river also becomes more open and its banks lined with reeds.

The country is well watered and capable of supporting large herds of cattle, and near the coast the soil is said to be suitable for the growth of cotton, sugar, and coffee; copper is supposed to exist in various places in the vicinity.

White's Station is a trading post 7 miles up the river on the right bank, and about 2 miles beyond is a wagon drift, known as Davis's Drift, but it is a dangerous crossing. Small craft drawing 6 feet can navigate to within ½ mile of the drift, and in many places can lie alongside the banks. There is plenty of good timber and limestone in the neighborhood of the river, which is tidal to about 1 mile above the site of Fort Harrison, dismantled in 1882.

Port limits.—The following are the limits of the port under the harbor authorities as defined by the Government: The area included within a line drawn from Cape Hermes Signal Station to a point at sea bearing 180°, 1 mile; from that point to another point bearing from it 90°, 2 miles; and from the last-named position to Bluff Point bearing 2.6 miles. Also the whole area of tidal waters of St. John River and its tributaries including its banks and foreshores to high-water mark.

The port is under the control of the department of railways and harbors, eastern division, the local authority being the port officer, whose orders, messages, or signals should be promptly obeyed and carried out.

Bar—Depths.—The bar, about 500 yards southeastward of Porpoise Rock, the eastern point of entrance, is about 200 yards in breadth, the average depth at low water being about 6 feet; on both sides of the channel there are often heavy breakers, and at times the sea breaks across the entrance for four or five successive days, especially after southwest gales, when the rollers are unsusally high.

The bar is of quicksand and constantly shifting, and in December the channel is on the eastern side near the Porpoise Rock, but as the dry season advances it moves westward until June or July. In June, when the bed of the channel is on the western side, the depth on the bar may be as little as 4 feet at low water, and in the rainy season it may increase to about 8 feet, but the depth entirely depends on the rainfall.

As much as 20 feet has been found in freshets, and these may occur at any time, as in June, 1902, when a sudden freshet, of which there was no warning, came down the river and took to sea a sailing ketch, which was lost with all hands. The rainy season prevails from October to April.

Even during the unfavorable part of the year for small craft entering the river, except during very boisterous weather, the bar is always practicable for surfboats, but no boats are permitted to cross the bar without permission of the port officer, under a penalty of £10.

Bar signals are made from the signal mast at the port office, and in no case should a boat attempt to cross the bar unless the blue flag is hoisted at it.

1. Blue flag at east yardarm: Open boats may cross or recross bar.
2. Black ball close up under west yardarm: Bar impassable for any open boat.
3. Black ball as above at the dip: Caution is requisite.
4. Red flag over blue flag at east yardarm: Recall for all fishing boats. Come at once.
5. Red flag at west yardarm, blue flag at dip at east yardarm: Wait until flood tide.
6. Red flag at masthead: Freshet expected. Secure all small boats.

Life-saving station.—A rocket apparatus is stationed at St. John Harbor.

Tides.—It is high water, full and change, at St. John River, at 4 h. 8 m.; the rise is about 5¼ feet.

Settlement.—A settlement, formed in 1883 on the western bank of the river, contained in 1912 a European population of about 250. The resident magistrate of the territory discharges the functions of port officer. A wooden jetty extends for a distance of 170 feet along the west bank of the river just within the entrance; it is 35 feet in width and has a depth of 9 feet alongside.

Communication.—The construction of a railway has been proposed which will have two branches, one extending westward to Umtata, the other northward to Kokstad in Griqualand; when completed there will be through communication between Cape Town and Port Natal.

Supplies.—Provisions and good water are obtainable, but no coal, and there are no facilities for repair. Timber and limestone are abundant.

Trade.—The values of the exports and imports are very small; 97 steam vessels entered in 1912.

Bluff Point is about 2 miles northeastward of the entrance to St. John River, the shore between being skirted with rocks in places to a distance of 200 yards; a small stream enters the sea about 1,000 yards westward of that point. At 400 yards from the shore on the eastern side of Bluff Point is St. John Reef, with a least depth of 6 feet at low water.

Coast.—Northeastward of Bluff Point the coast, continuing high for about 15 miles to Waterfall Bluff, is intersected by a number of ravines, through which small streams discharge into the sea. The

Igosa Forest stretches from St. John River to Port Grovenor, a distance of about 22 miles.

The Entafufu River is about 6 miles and the Umzimklava River 9 miles northeastward of St. John River; the latter has a round hill on its eastern side, with two rocks at its base, and the Umzimpunzi and Embotyi Rivers are 3 and 4 miles northeastward of it.

Waterfall Bluff, the easternmost of a succession of bluffs, is about 200 feet high, and from its summit two streams of water fall into the sea, the westernmost forming a continuous cascade, but the eastern broken at about a third of the distance down. These falls may be seen 7 or 8 miles off, but in dry weather the volume of water is probably much diminished, if not entirely dried up.

Coast.—Northeastward of Waterfall Bluff, the coast, which is moderately high inland, sloping gently down to the beach, has a luxuriant appearance in the wet season, being clothed with bright green grass and clumps of trees and bushes, frequently relieved by streams and small cascades; but it is probable that a few weeks of drought greatly alters its appearance.

Port Grovenor.—A bight in the coast about 6 miles northeastward of Waterfall Bluff, has Ubazi River entering its head; there appears to be but little difficulty in landing goods here. A detached coral patch, reported to lie about 400 yards off the reef fronting the western point of the bay, or about 1,000 yards offshore, is said to extend farther seaward than as charted.

Coast.—A bight similar to Port Grovenor, situated about 4½ miles northeastward, and into which the Umtsikaba River discharges, has on its eastern side South Sand Bluff, a round-topped sand hill presenting a sandy bluff to the westward, the top being covered with bush. A similar sand bluff, which is very conspicuous, lies 21 miles farther northeastward, and midway between them is a red-topped hill, which is in sight from both bluffs.

The Umtentu and Isikota Rivers enter the sea between South Sand Bluff and Red Hill, and the Umyameni, Umzamba, and Umtamvuna, besides smaller streams, between the Red Hill and North Sand Bluff, the latter 11 miles northeastward. The southern point of the Umtentu River is marked by a quoin-shaped hill, and on the southern side of the Umtamvuna River there is a strip of sand up the side of a wooded hill, which shows like a road; coming from the northward it opens out when bearing about 248°.

The Umtamvuna River forms the southern boundary of the Province of Natal.

Coast.—The coast trending for a distance of 21 miles in a northeast direction from the Natal boundary to the Izotsha River is without prominent features or offlying dangers of any sort, except that

7 miles northeastward of the boundary and 1 mile southwestward of Umpenjati River are two sunken rocks 1,000 yards offshore.

Congella Shoal, on which a vessel grounded in 1906, is reported to lie about 1 mile offshore, and about 55°, distant about 4 miles from North Sand Bluff.

Izotsha River, about 18 miles northeastward of North Sand Bluff, may be known by the large house on its southern bank; foul ground has been reported to exist at from 1 to 4 miles offshore in the vicinity of the Izotsha and Umbango Rivers.

Port Shepstone.—Umzimkulu River, 3½ miles northeastward of Izotsha River, is easily recognized, as on the southern side of its entrance is a long low point, which rises to a height of 300 feet at 2 miles from the sea, and has on it the signal station and signalman's lookout. Behind it lies the scattered village of Lower Umzimkulu.

Light.—On the southwest point of entrance is a black and white checkered tower, 25 feet in height, with a white lantern which exhibits, at an elevation of 78 feet above high water, a white occulting light; it should be visible in clear weather from a distance of 15 miles. (For bearings of arc of visibility, see Light List.)

Port.—The estuary forming Port Shepstone extends about 8 miles inland, with a width of about 200 yards at its mouth, but no seagoing craft of any description can cross the bar, which has shoaled to such an extent that the river mouth is sometimes completely closed.

Communication.—The south coast line of railway skirts the coast to Port Natal, via Umzinto, a distance of 74 miles, while a line runs inland to Harding; there is telegraphic communication with the telegraph system of the colony.

Trade.—The trade consists of lime, cement, marble, cattle, grain, fruit, and farm produce, and there are sugar and tea plantations and factories.

A rock was reported in 1895 as lying 1,500 yards offshore at about 3 miles northeastward of Port Shepstone.

Life-saving station.—A rocket apparatus is maintained at Port Shepstone.

Coast.—Red-topped Hill, 231 feet high, and about 15 miles northeastward of Port Shepstone, has a native kraal in the valley just eastward of it. Umtwalumi River, about 3½ miles farther northeastward, is conspicuous, and somewhat resembles St. John River; it is the only river with high, steep banks northward of Port Shepstone, and when it is open a remarkable rocky peak is seen in the opening, and high up on the left bank are a few houses.

Besides the streams mentioned by name between St. John River and Natal are many concerning which there is no information beyond that shown on the chart, and it will be noticed that few soundings have been taken in this locality, so that caution should be exercised.

Current.—Owing to the configuration of the coast northward of Cape Natal the Agulhas current is deflected from the shore line at Durban but strikes it again in the vicinity of Port Shepstone, causing an interval of slackness between the latter point and Durban, and a vessel proceeding within 2½ to 3 miles from the coast would, after passing Port Shepstone, gradually lose the current until Aliwal Shoal is reached, when its effect would be practically imperceptible.

Umzinto River and Bay.—The mouth of the Umzinto River is 26 miles northeastward of Port Shepstone, and 3 miles inland of Umzinto village are the Umzinto Co.'s sugar estates and several farms. Umzinto Bay is about 1 mile northward of the river. There is a whaling station, the headquarters of the vessels being at Durban; as these vessels can not come alongside here, the whales have to be hauled through the surf.

Communication.—The coast railway runs southwestward to Port Shepstone and northeastward to Port Natal, and a line to Donnybrook connects with Pietermaritzburg; telegraphic communication with all parts.

Scottsburg is a small town about 5½ miles northeastward of Umzinto River, and midway is Park Rynie, both being stations on the south coast line.

Beacon.—A beacon, consisting of a mast surmounted by a disk, the upper half of which is red and the lower half white, at an elevation of 159 feet, stands on the shore at Scottsburg, and southward of the entrance to Umpambinyoni River.

Green Point, about 2½ miles northeastward of Scottsburg, rises to 360 feet at about 1,200 yards within it.

Lights.—On Green Point is a cylindrical tower 68 feet in height, with red and white bands, which exhibits, at an elevation of 282 feet above high water, a white group flashing light, which should be visible in clear weather from a distance of 23 miles.

From the same tower a red fixed light is shown at an elevation of 248 feet, covering Aliwal Shoal. (For bearing of the arcs of visibility of both lights, see Light List.)

Beacon.—About 500 yards southeastward of the lighthouse is a pyramidal beacon, surmounted by a cask, which in line with the lighthouse, bearing about 282°, points out the direction of Aliwal Shoal. By day the lighthouse may probably be seen from distances of 14 or 15 miles, and a white house, just eastward of Hafa River, is also a useful mark when approaching from the southwestward.

Aliwal Shoal, rocky, dangerous, and about 1,400 yards in length in a northeast and opposite direction, and 200 yards in width, between the 5-fathom contour line, has a least depth of 1½ fathoms on its northeast end, and lies in the track of vessels proceeding along the coast, being 2½ miles off Green Point with the lighthouse and beacon in line. The depths are from 14 to 17 fathoms at 400 yards from the shoal, and from 12 to 15 fathoms between it and the coast.

Directions.—By day, in clear weather, there is no difficulty in passing inside Aliwal Shoal; in thick weather, either by day or night, vessels should pass outside, and not stand into less than 40 fathoms.

By night.—To pass inside the shoal, if from the southward, steer toward Green Point white flashing light, keeping it a little on the port bow, and, as it is approached, shaping course so as to pass about 1¼ miles seaward of the point. When the red fixed light shows, and until it disappears, the vessel will be passing between the Aliwal Shoal and the shore, about 1 mile distant from the shoal. After passing the shoal a course may be steered as necessary up the coast.

If from the northward, reverse the directions just given.

To pass outside the shoal, from either direction, when Green Point white flashing light is sighted, steer so as to pass about 5 miles outside it. When passing through the arc of red light, the shoal should be about 1½ miles inshore of the vessel, and the depth of water between 30 and 40 fathoms.

Current.—A strong current sets over the Aliwal Shoal in a southwesterly direction, but midway between the shoal and Green Point it is reduced to 1 knot or less, or at times a counter current sets to the northeastward.

Beacon.—Amahlongwana River is nearly 2 miles northeastward of Green Point, and on the north side of the entrance is a beacon 170 feet above high water, consisting of a mast surmounted by a white triangle.

Umkomass (Umkomanzi) River, 3 miles northward of Green Point, had from 6 to 7 feet over its bar, at high water, its mouth being a tidal estuary, about 100 yards in width, which formed a port suitable for small coasting steamers; but owning to the shoaling of the bar and its extension across the entrance, the estuary can not now be considered available even for small craft. Several estates and scattered farms are in the district, and near a hotel, at about 8 miles from the mouth of the river, is good fishing, while higher up the scenery becomes broken and wild, and game is abundant.

Communication.—The railway between Port Shepstone and Port Natal, crosses the river close to its mouth, and a good road traverses the whole of the country; a ferryboat crosses the river near the hotel.

Rock—Caution.—At 8 miles northeastward of the Umkomass River is the little river Amanzimtotana, and in 1903 the existence of a rock, awash at half tide, was reported at about 1 mile eastward of its entrance. As no soundings have been obtained between the neighborhood of the Aliwal Shoal and Port Natal, this shore must be considered dangerous of approach.

False Bluff, 418 feet in height, is about 12 miles northeastward of Umkomass River, and 2 miles farther in the same direction is the Umlazi River, which drains the Ipisingo Flat and the sugar plantations; there are several steam mills near the river.

Cape Natal, also known as Natal Bluff, 9½ miles northeastward of Umlazi River, is a high wooded tongue of land terminating in a remarkable bluff, 195 feet high; it is easily identified, the coast to the northward receding and being low for several miles. On the summit is a light tower, signal station, and time ball, and at its base a quarantine station and several whaling factories; on its eastern side is Cave Rock, 20 feet high. There are no outlying dangers in approaching the cape, the water being deep close to the breakers.

Light.—Near the extreme of Cape Natal is a white, conical, iron tower, 81 feet in height, which exhibits, at an elevation of 282 feet above high water, a white revolving light, which should be visible in clear weather from a distance of 24 miles.

Lloyd's signal station.—Vessels can communicate by day by the International Code, with a Lloyd's signal station near the lighthouse, and by night by Morse signals, signals being passed through to the port office, situated within the root of the North Pier, both signal stations having semaphores and being connected by telephones.

Radio station.—The radio station, situated at Stamford Hill, about 4 miles northwestward of Cape Natal, is open at all times to the public, the call letters being V. N. D.

A weather report issued from this station every day, except Sundays, at 1 p. m., contains, in plain language, meteorological information affecting the coast of the Union of South Africa.

Port Natal.—The peninsula, of which Cape Natal is the extreme, forms the southeast side of a bay, or landlocked lagoon, about 3½ miles in length in an east-northeast and opposite direction, with a width of 2 miles, the northeast side of the bay being inclosed by another peninsula extending southeastward; this bay, partly filled with sand banks, dry at low water, is intersected by channels, and has large deep-water areas, available for ocean shipping, on its northeastern, or point side, and on the bluff side, also to the westward at Congella.

Entrance.—The entrance is formed on its southeast side by a south breakwater, which extends about 36° for about 1,200 feet, from the extremity of Cape Natal, and by a north pier extending about 3,000 feet, in a similar direction, from the eastern point of the peninsula on the opposite side; between this pier, which curves somewhat to the eastward at its extreme, and the south breakwater, the entrance is about 600 feet in width.

Lights.—On the south breakwater head is an iron tower, 9 feet in height, with red and white bands, from which is exhibited, at an elevation of 22 feet above high water, a white fixed light, visible in clear weather from a distance of 3 miles.

About 200 feet from the breakwater head, a temporary white fixed light is exhibited from a pole, at an elevation of 20 feet above high water, as a substitute for the breakwater light, which will not be used until the work in course of construction is completed.

On the extremity of the north pier is a red tower, exhibiting a red occulting light. In clear weather it should be seen from 4 miles.

At the rocket station, on the east side of the peninsula on the northwest side of the entrance, and 1¼ miles northward of its extreme, is a triangular beacon, from which a white flashing light is exhibited at an elevation of 88 feet. It should be seen from 5 miles in clear weather.

Life-saving station.—A rocket apparatus is kept near the preceding light, being in charge of the light keeper; another is situated at the root of the old north pier, and a third is at the extremity of the bluff, near Cave Rock.

Natal Road, the space fronting the entrance to the port, is free from dangers in the approach, and on the south side the east shore of the peninsula has no dangers outside of 200 yards distance; on the west side of the road the 3-fathom contour line trends from the end of the north pier, having within it the old north pier, level with low-water spring tides, and having a beacon, consisting of an iron triangle, surmounted by a disk, on its outer end, from which the contour passes nearly 450 yards outside of the rocket station.

Outer anchorage.—The best berth in the road is in a depth of 10 fathoms, over good holding ground, with Cape Natal Lighthouse bearing 188°, and the rocket station 254°; but there is no shelter during southerly and easterly winds, and a heavy swell always sets in along the coast. In a more southerly position the outgoing tidal stream swings vessels broadside on to the swell, causing them to roll heavily.

A vessel arriving in the road during bad weather should signal for instructions before anchoring, and with bad weather threatening a sailing vessel should anchor in a depth of about 16 fathoms, at 2½ miles from the cape lighthouse, so that it would be possible to fetch out on one tack or the other, with the wind from any quarter; but in the event of parting, a sailing vessel should run for the beach abreast the rocket station, keeping the head sails set and the crew on board until communication with the shore is established by the rocket apparatus; wrecks are, however, infrequent, none having occurred for 20 years.

Caution.—When the wind is inclined to freshen from the southeastward, with a long swell and a high barometer, vessels should proceed to sea as soon as possible. Heavy seas from the southeastward sometimes occurring, are generally preceded by an unusually low barometer for three or four days before being felt in the roads.

Port.—The entrance channel is about ¾ mile in length in a southwest direction, and the port then turns northwestward for about 1 mile, with a greatest breadth of about ½ mile in its center, where it extends southwestward. Training walls and wharves extend along the southeast side, the extent of the latter on that side being 1,585 feet of permanent quay wall, and 1,050 feet of timber wharfage.

On the northeast side, known as the Point, are 6,866 feet of permanent quay wall, with rapid electric coaling plant, available for day or night use; there are also 1,395 feet of timber jetties. The wharves are fully equipped with railway lines, and electric and hydraulic capstans at convenient distances for hauling rolling stock.

The port is equipped with the following cranes: One of 50 tons, one of 10 tons, 28 of 3 tons, and 16 of 1½ tons, all worked by hydraulic power. There are 11 electric cranes of 3 tons, 2 steam of 5 tons, and 2 of 3 tons, besides a 15-ton floating crane, and there are also 17 hydraulic, and 8 electric wharf capstains. At Congella, on the western side, are 2,660 feet of timber wharfage.

Sheds have an aggregate storage room for about 104,000 tons, not including the bond store, which is fitted with a 50-ton hydraulic lift to take loaded trucks up two floors; the whole of the wharves and sheds are lighted with electric arc lamps.

Lightbuoys.—On the southeast side of the entrance channel, and on the 5-fathom contour line, about ½ mile inside the head of the south breakwater, is a lightbuoy showing a fixed white light.

A similarly lighted buoy is moored on the northwest side of the channel, about 300 yards westward of the preceding buoy.

A red lightbuoy, showing a white fixed light, is moored at the northeast end of the bank on the northwest side of Bluff Channel, and 350 yards northwestward of the west end of Bluff Quay.

A similar lightbuoy to the preceding one marks the northeast side of a bank which fronts the quays on the northeast side of the port.

Leading lights.—Two leading lights, for use in entering the port, are situated on the south side of the harbor, and are in line bearing 217°, and 1,200 yards apart.

The rear light, which is fixed white, is on the peninsula on the south side of the harbor, 600 yards southeastward of Milne Point; the front light, fixed red, is on the eastern edge of a drying bank, which forms the west side of Bluff Channel.

Depths.—The depths on the bar vary constantly and especially after strong winds, but any banks formed are removed by dredgers with as little delay as possible, and at low water a depth of 35½ feet is maintained on the bar, so that vessels of deep draft can enter at all times of tide, the greatest draft, entering in 1914, being $31\frac{1}{12}$ feet, while within, the depths in the port are from 30 to 46 feet, except within the 5-fathom contour line on the south side.

At Bluff Quay, on the southeast side, the depths are from 30 to 34 feet, and there are similar depths at a wharf on the northeast side and Main Quay, on the same side, which is 6,866 feet in length, has from 23 to 38½ feet; several quays or wharves have from 24 to 25 feet alongside, and the total length of quayage in 1914 was 13,556 feet.

Three main channels lead through the sand and mud banks, Bluff Channel, the southeastern, having from 3 to 15 feet; Salisbury Channel, the middle one, from 7 to 14 feet, and Esplanade, the northwestern, which leads to Congella Wharf, recently constructed, and having a length of 2,660 feet, with a depth of 25 feet alongside, has from 24 to 30 feet in the fairway.

Dredging signals.—The depths are maintained by dredging, and when dredgers are at work, or in a position for working, the following signals are shown, indicating that the dredger is not under command, and can not get out of the way, therefore the speed of vessels must be reduced to insure passing the dredger without causing damage:

By day.—1. Three black balls, placed about 10 feet apart, in the form of a triangle.

By night.—Three red lights similarly placed.

2. One red ball placed underneath the triangle, at the end of the yard, by day, or one white light similarly placed, by night, indicates the side on which the dredger may be passed, and when this signal is not shown the dredger can not be passed on either side.

Mooring buoys.—Fifteen sets of moorings are placed in the port, three in low water depths of 30 feet, and the remainder in from 9 to 24 feet.

Pilots.—On the usual signal for a pilot being made, one will be sent to a vessel arriving in the roads unless the surf on the bar is too heavy, in which case the fact will be communicated by signal. Vessels are taken in by night as well as by day, and those arriving in the road by day and wishing to enter the harbor, are generally taken in at once. Pilotage is compulsory, and no vessel should attempt to cross the bar without one.

Should the entrance be considered to be impassable, a black cone, point downward, by day, or a red light, by night, is hoisted at the yardarm of the signal station.

Tugs.—Three Government tugs, as well as numerous private ones, are available.

Directions.—The only danger in approaching Natal Road from the southwestward is Aliwal Shoal, which may be easily avoided by attention to the lights and directions given at pages 166, 167, and in thick weather a vessel should not stand into a less depth than 40 fathoms when in its vicinity. Southward of Port Natal the soundings are coarse gray sand and stones, whilst to the northward fine black sand will be found; the roadstead may be safely approached by the lead, the decrease in the depths being regular.

Having passed about 3 miles outside Aliwal Shoal, Cape Natal Lighthouse by day, or the light by night, bearing about 20°, leads outside all known dangers until abreast of Umlazi River, and when to the northward of it, the vessel should be kept about 1 mile from the land until Cape Natal Lighthouse bears 272°, when the roadstead may be steered for.

If entering the port and the leading light structures can be made out, they should, when in line, bearing 216°, lead nearly in mid-channel through the entrance channel, as also the leading lights by night. Vessels of almost any draft can lie alongside the wharves at low water, and unload directly into railway trucks, and when removed from the wharves they will be taken to moorings. Vessels laden with explosives are berthed on the Bluff side or at the moorings.

Bar signals.—The following bar signals, to indicate the state of the bar, are made from the flagstaff at the port office:

1. A cone hoisted halfway to the yardman: Bar dangerous.
2. A cone hoisted to the yardman: Bar impassable.

Tides.—It is high water, full and change, in Port Natal at 4 h. 30 m.; springs rise 6½ feet, neaps rise 4 feet, neaps range 1½ feet.

Tidal streams.—The in-going stream through the entrance channel has a velocity of about 2½ knots, and the outgoing stream about 3½ knots; the north-going stream in the roads is that of the rising tide, the other stream setting to the southward.

Current.—**Caution** is necessary to allow for the strong current, generally setting southwestward, at rates of from 2 to 3 knots an hour, beyond a distance of about 3 miles from the shore.

Winds.—The prevailing winds at Port Natal are from northeast to east, and from southwest to south, in about equal proportions, alternating throughout the year, in periods seldom exceeding a few days for either. Although the wet season is from October to March, rain occurs occasionally all the year round, and after a continuance of rain with a rising barometer, an easterly gale follows, after which the weather clears.

During the finest months, May to July, inclusive, a light breeze comes in from seaward by day, and a land breeze blows during the night, but strong gales both from the eastward and westward occur even during these months, and from August to October, inclusive, the most boisterous months, when the range of the barometer is great, gales alternate between east and west.

Gales from the eastward blow from about southeast at from 50 to 100 miles off the land, but being deflected to east northeast or northeast on reaching the coast the swell set up by the wind at southeast so far seaward, catches vessels at anchor in Natal Road, and heading to the wind on the starboard bow, causing them to ride uneasily, and if they part their cables, to cant toward the shore.

Town.—Durban, the town of Port Natal, standing on a low flat, is the largest town in the Province, and said to be the cleanest and best kept town in the Union of South Africa; it is well laid out, with wide streets lined with trees, the houses being principally of brick, but most of the wealthy inhabitants reside on the Berea, a wooded height overlooking the town.

It has excellent public buildings, consisting of banks, institutes, societies, clubs, Anglican churches, and various chapels, besides a market and several good schools; the town is lit by electricity, and has electric trams in the streets. In 1911 the population was 72,512, of which number 33,271 were whites.

Communication.—The following are the principal steamship lines visiting the port: Union Castle Line mail steamers from Southampton and intermediate steamers from London monthly; Aberdeen Direct Line and Natal Direct Line from London fortnightly; Liverpool White Star, P. & O. Branch service, Aberdeen White Star and Blue Funnel Lines from Australia to England monthly. Several lines of freighters have regular sailings from the United Kingdom, the Continent, and North America.

The railway which runs to the Bluff as well as to the Point connects Durban with Thornville Junction, from which a line runs northward to Pietermaritzburg, and with branches to Mid Illovo and to Richmond; the coast lines run southwestward to Port Shepstone and northeastward to Somkele, in Zululand, with numerous stations near the coast between.

Submarine cables connect Durban with England via Delagoa Bay and Zanzibar, also via Cape Town, while another connects with Mauritius direct, and thence via Rodriguez, and Cocos Island, to Fremantle, in Australia.

Coal and supplies.—About 25,000 tons of coal are kept in stock, and from 8,000 to 9,000 tons could be obtained daily from the mines, the amount being only limited by the labor supply; an Admiralty contract exists for a supply of Natal coal to British transports.

The coaling plant at the Bluff can load at the rate of 400 tons an hour, either from bins or direct from trucks, the whole plant being worked by electricity, and weighing done automatically.

The Government wharves are from 580 to 4,860 feet in length, with depths of from 25 to 38 feet alongside, and 5,000 tons could be put on board in 24 hours from them, or, if coaling elsewhere by baskets, about 2,000 tons, there being 48 lighters holding from 90 to 240 tons each, but if coaling in the roadstead strong southwest and eastnortheast winds might interfere with coaling.

Fresh provisions and supplies of all kinds may be obtained and excellent water is laid on to the wharves, and is sent off to vessels in the roadstead.

Dock.—A floating dock is situated at the northwest end of the port, and a small patent slip is on the north side of Salisbury Island. The construction of a large graving dock has been sanctioned.

Repairs.—Large repairs to machinery can be effected, and the various cranes have been mentioned in connection with the wharves; there are two steam hammers, the largest 15 hundredweight.

Hospitals.—The Government hospital, within 1 mile of the shipping, admits all classes, and a sanatorium and private hospital are situated on the Berea.

Time signal.—The time signal is situated about 200 yards southwestward of Cape Natal Lighthouse, and the ball is dropped, except on Sundays, at noon, South Africa standard time, corresponding to 22 h. 0 m. 0 s. Greenwich mean time; if the signal fails in accuracy, a blue flag with a white center is hoisted about 5 minutes after the time of the signal, showing that it was unreliable.

In addition to the time signal on the Bluff, an hourly signal is sent to the port captain's office, where it rings a bell.

Trade.—In 1912 the exports were valued at $24,930,783, including gold, and the imports at $58,494,869.

Coast.—**Umgeni River,** 3¾ miles north-northwestward of Cape Natal, rises at Spion Kop, is about 120 miles in length, and has two large waterfalls, one at Howick being a magnificent fall, 350 feet in height, while the other, 12 miles lower down the river, is 70 feet; the valley through which the river runs is well defined from seaward, as the hills on the north side of it are wooded, and those on the south, forming the Berea Range, are thickly covered with houses.

Trout having been introduced into the river, excellent fishing may be obtained on it; Umgeni village, about 1 mile within the entrance, is a station on the Coast Railway.

Life-saving station.—A rocket apparatus is situated on the rocky foreshore, about 1½ miles northeastward of the Umgeni River mouth.

Depths offshore.—Depths of 10 fathoms, over sandy bottom, will be found about ¾ mile off the river mouth.

Coast.—From Umgeni River the coast, trending northeastward for 10½ miles to the Umhloti River, is generally sandy and backed by hills from 300 to 550 feet in height; a considerable amount of this land is under cultivation, but there are extensive groves of trees on the slopes and in the valleys.

Umhlanga River, entering the sea about 7 miles northeastward of Umgeni River, is small, and its mouth is not so clearly defined as those of other rivers on this coast; in its vicinity the summits of the coast hills are rounded and grassy, without any conspicuous features. At Ottawa, about 5 miles up the river, is a station on the Coast Railway.

Umhloti River is readily distinguished by a steep wooded bluff 200 feet high, and with a black appearance, on the south side of its mouth, and also by the comparatively gradual slope of the hills on its northern side. Mount Moreland, about 3 miles from the entrance, is a station on the Coast Railway.

Tongaat River, 5½ miles northeastward of Umhloti River, has a well-marked valley, and a rocky coast to the southward of its entrance. Between these rivers the hills are from 300 to 500 feet high, their seaward slopes being steep and partly wooded, with several deep ravines, but their summits are difficult to distinguish. Tongaat is a station on the Coast Railway.

Tongaat Bluff, a conspicuous dark hill, 460 feet high, and having a whale-back appearance, is partly covered with trees, and has a farmhouse on its summit.

Coast.—From Tongaat River the coast, trending northeastward, is sandy for a distance of 2 miles, and then changes its character, and for the next 2 miles is very broken with some conspicuous red cliffs, about 50 feet high, and having sandy beaches between them. For the next 3¾ miles, the coast is alternately rocky and sandy, as far as Umhlali River, the entrance to which is very narrow, and has a long, low sand spit on its northern side. There is a station at Umhlali, about 4 miles from the entrance.

From Umhlali River, the coast trending to the northeastward for 5¼ miles to Umvoti River is somewhat broken, and is composed of sand and rocks, with one or two off-lying rocks close to it; the coast hills, from 200 to 350 feet high, have a few patches of trees on the seaward slopes, and some red scars in the valleys.

Umvoti River, rising near Bester Hoek, has a course of about 80 miles, the land near its entrance being low and sandy, except at the eastern extreme of the southern point of entrance, which is rocky and has a patch of rocks extending off it for a distance of about ¼ mile.

Knob Hill, 346 feet high, and situated 1 mile westward of the mouth of Umvoti River, has a peculiar spherical knob on its summit and several large scars; it is a conspicuous mark from seaward.

Coast.—From Umvoti River the coast, trending northeastward for about 13 miles to the Tugela River, is generally sandy; the coast hills, from 150 to 370 feet high, having round grassy summits which are not easy to identify.

The Umhlutane, Nonoti, and Sinkwasi, three small streams, run into the sea on this stretch of coast, their courses being readily distinguished by the valleys, which form most useful marks in this locality.

Depths offshore.—No off-lying dangers exist between the Umgeni and Tugela Rivers, and depths of 10 fathoms or more are found at a distance of 1 mile from the coast, except in the vicinity of these two rivers, where the depths increase rapidly to 20 fathoms.

The 100-fathoms contour line, passing about 6½ miles outside Cape Natal, gradually increases its distance from the shore until off the Tugela River, from which it is upward of 25 miles; the bottom is chiefly sand or mud, but in the vicinity of the Tugela River are some patches of rocky ground.

Anchorage on this part of the coast is not recommended, but should it be absolutely necessary to anchor, the best holding ground will be found in depths of 25 fathoms, and at least 100 fathoms of cable should be veered.

Winds.—May, June, and July are comparatively fine months, but gales from northeast and southwest, seldom lasting for more than two days, are experienced, with sometimes dangerous shifts of wind from the former to the latter direction; the barometer generally falls for northeast and rises for southwest winds. In these shifts the wind may be from northeast, with a force of from 4 to 5, and the barometer standing at 29.90, when the change, occupying only a few minutes, and with a brief interval of calm and a cloudless sky, takes place to the southwest, the force increasing to from 6 to 7.

Current.—From Cape Natal to the Tugela River the current is weak in force and generally influenced in direction by the wind when in depths of less than 50 fathoms, but outside the 50-fathoms contour the current is more regular, setting southwestward with a velocity of from ½ knot to 1 knot.

It seems possible that the current, formed by the junction of the trade drift from the southern end of Madagascar with the Mosambique Channel current, is deflected from the coast by the bank extending off the Tugela River, and that consequently there is little or no current near the coast until it recurves in the neighborhood of the Umtamvuna River.

Tugela River, rising on the eastern side of Mont Aux Sources, in the Drakensberg, where near its source it falls almost perpendicularly from a height of 1,800 feet, runs through deep, rocky channels in a wild, hilly country, he scenery throughout being picturesque and often grand; while the Victoria Falls, on the Zambezi, may exceed the Tugela in volume of water, the latter are said to be the more beautiful.

From the foot of the falls the river winds for 200 miles to its mouth, receiving in its course the Klip, Sundays, Buffalo, Bushman, and Mooi Rivers, the two last its principal tributaries. When in flood the upper portion of the river is a succession of rapids, and the lower river is useless for transport in winter, the dry season, as then boats ground repeatedly.

The entrance is easily recognized from seaward by Tugela Bluff, its southern head, which is 337 feet high, covered with trees, and having a black appearance, while on the northern side is Red Hill, 287 feet high, scarred with red, and having a peculiar knob on its summit. The bar is impassable and the river unnavigable. Trout introduced into the Bushman's and Mooi tributaries afford good fishing.

Beacons.—A number of beacons, for surveying purposes, have been erected on the coast between Tugela River and Cape St. Lucia.

Communication.—A station on the Coast Line is near the entrance to Tugela River.

Coast.—From the Tugela River the coast trends in a northeast direction for about 11½ miles to Matikulu River entrance, and inland are several mountain ridges having no conspicuous features; the coast hills, rounded and grassy, are marked in places with red scars, and on a flat summit, 386 feet high, and 6 miles northeastward of Tugela River entrance, is a single tree standing up conspicuously.

Inyoni River, breaking through the coast ridge about 3¼ miles northeastward of Tugela River, and flowing along the coast for 5 miles, just inside the sand ridges, discharges, in the rainy season, about 3 miles to the southward of the Matipulu River entrance.

Dangers.—Off the northern side of the entrance to Tugela River the 5-fathom contour line is 1 mile off, and inside it the bottom is very irregular, with several patches having from 2½ to 3 fathoms over them; the coast reef, on which the sea breaks heavily, extends about 600 yards off this coast.

Matikulu Bluff, about 8½ miles northeastward of the Tugela River, is a round, dark, wooded hill, 313 feet high, and the most remarkable headland in the neighborhood.

Matikulu River is easily recognized by Matikulu Bluff, as it passes close under it and then runs along inside the beach, discharging about 2½ miles farther northeastward; the river is open after heavy rains, but the sea breaks heavily across its mouth.

Rocky ledges, having depths of from 3 to 5 fathoms over them, extend off the mouth of the Matikulu River and the adjacent coast for a distance of 1,800 yards.

Coast.—From Matikulu River the coast trending northeastward for about 13 miles to Umlalazi River has innumerable shifting ridges of sand formed just within the beach, but the coast hills, consisting of long grassy ridges of moderate height, possess no distinctive features except being noticeably lower than those to the southwestward of the Matikulu River; several farms and sugar plantations may be seen dotted over the hills.

Vedette Hill, 319 feet high, and about 1 mile westward of Umlalazi River, has the Mtunzini Magistracy, situated in a clump of trees on its summit, forming a fairly conspicuous object; a few houses are scattered along the ridge to the northeastward of it.

The North Coast Railway, from Durban to Somkele, after crossing the Tugela at Bond Drift, runs from 5 to 8 miles inland, but again approaches the coast at Emoyeni station and hill, about 15 miles from Tugela River, and then runs close within the coast and on the seaward side of Vedette Hill.

Glenton Reef, an extension of the coast reef seaward, between Matikulu and Umlalazi Rivers, commencing just northeastward of the former, gradually increases its distance from the coast, until abreast the southern side of Vedette Hill, where it is 1¼ miles offshore; it has depths of from 1 to 2 fathoms, and breaks heavily. Vessels should keep at least 3 miles from the coast, or in not less than 10 fathoms water, when passing it.

Umlalazi River, flowing through the hills to the northeastward of Vedette Hill, and then taking a sharp turn to the southwestward under that hill, runs eastward just inside the sandy ridges, and discharges into the sea about 3½ miles eastward of Vedette Hill.

Ungoye Mountain, about 7 miles northward of Vedette Hill, is an extensive flat-topped mass, with no very distinctive summits, but rising at its greatest elevation to 1,584 feet; the ridge gradually descends on the eastern side, until it is merged in the lower country at about 7 miles from the hill.

Coast.—The coast from Umlalazi River, trending east-northeastward for 10½ miles to Durnford Point, has generally low coast hills, few being over 200 feet, and, with the exception of Mainhluyami or Grassy Hill, are sandy and covered with bush.

Tenedos Shoal, large, irregular shaped, and extending 1½ miles from the coast, at the same distance eastward of Umlalazi River entrance, has a least depth of 1¼ fathoms, situated 1½ miles, 117°, from the mouth of that river, and in the bight between Glenton Reef and this shoal are a number of rocky ledges with from 3½ to 5 fathoms over them and extending 1½ miles from the coast.

A narrow passage between Tenedos Shoal and the shore has depths of from 2½ to 4 fathoms, but it is only available for boats and in fine weather.

Port Durnford is about 2½ miles eastward of Tenedos Shoal, and off the mouth of the Umhlatuzana River, which is usually blocked by sand, but its position may be known by a gap in the hills through which the river runs, and by Mainhluyami or Grassy Hill, which appears flat-topped and grassy, when seen from the eastward, and has a dark bushy summit, surmounted by a round tree, just westward of it.

Directions.—Approaching Port Durnford from the southwestward, Durnford Point should be steered for, bearing 51°, until a conical sandhill, ¼ mile eastward of Umhlatuzana River mouth bears 349°, when the anchorage may be steered for; from the eastward the two obelisks, near Durnford Point, should be a good guide for fixing the position of the vessel.

Anchorage may be obtained, in depths of from 4½ to 6 fathoms, at about ½ mile offshore, with Umhlatuzana River mouth bearing between 295° and 2°, and Durnford Point 64°; this anchorage is a good one with easterly winds, but with those from the westward a sea soon gets up and heavy rollers set in, necessitating putting to sea.

Landing may occasionally be effected at the mouth of Umhlatuzana River, and stores were landed here by surfboats in the months of July and August, but landing appears to be better in May and June.

Communication.—Port Durnford Station, on the North Coast Railway, is about 1½ miles from the coast abreast Tenedos Shoal, after which the railway strikes inland, running about 15 miles within the coast to the northward.

Depths offshore.—The 10-fathom contour line passes about 6 miles off Port Durnford and about 3½ miles off Durnford Point, the bottom being everywhere rocky; reefs extend in places to 2 miles from this coast, and in bad weather the rollers break heavily in from 7 to 8 fathoms.

Current.—The current outside the 100-fathom contour line sets southwestward at rates of from 1 to 2 knots, but in fine weather on the bank within that depth it will generally be found setting northeastward with velocities varying from ¼ to 1 knot; with fresh northeast winds this current quickly changes its direction, setting southwestward, with rates varying according to the strength of the wind, the maximum velocity observed, during the survey of the coast by the British naval vessel *Mutine*, 1911, being ¾ knot.

Caution.—Occasionally during this survey a current was observed to set between north and northwest, or directly on-shore, at rates varying from ½ to 1 knot, this current extending to a distance of 20 miles from the land; its existence is a serious danger to vessels navigating the coast in the vicinity.

Durnford Point may be recognized by Pudding Hill, 287 feet high and wooded, which is situated 1 mile westward of it. As already mentioned the bottom inside the 10-fathoms contour line is rocky, the bottom being uneven, and the sea brakes in depths of from 7 to 8 fathoms, while off the point reefs with depths of from 2½ to 5 fathoms extend for a distance of 2½ miles, and break in rough weather, so that the point should be given a wide berth.

Obelisks.—A white obelisk, 31 feet in height, its base at an elevation of 112 feet above high water, stands close to the beach at 2 9-10 miles westward of Durnford Point.

A black and white horizontally striped obelisk, 31 feet high, is situated close to the point, its base being 52 feet above high water.

Coast.—Cape St. Lucia is nearly 30 miles northeastward of Durnford Point, the coast between being formed by a sandy beach fronted by breakers, landing on the beach being practically impossible; this coast has several lagoons a short distance within it.

For a distance of 2½ miles northeastward of Durnford Point the coast hills are wooded and over 200 feet high, but from this they decrease in height to the mouth of Umhlatuzi lagoon, forming sandhills with occasional patches of bush.

Umhlatuzi Lagoon, separated from the sea by a strip of land about 1 mile in width, is about 4 miles in length in the direction of the coast and 2½ miles in breadth; its entrance, nearly 6 miles from Durnford Point, is 300 yards in width, the sea breaking heavily across it.

Coast.—Umhlatuzi bluff, 1 mile northeastward of the entrance to the lagoon of the same name, is steep, about 100 feet high, and appears well defined when seen from the eastward; from this bluff to O'Neill Peak, a distance of 4½ miles, the hills, of moderate height, are covered with bush, varied by occasional patches of open grass country.

A reef, with depths of from 3¾ to 4 fathoms, extends 1,600 yards from the shore at 2½ miles northeastward of the entrance to Umhlatuzi Lagoon, and several rocky heads, with from 4½ to 5 fathoms, are situated from 1¾ to 2¾ miles southward of O'Neill Peak, and about 1 mile offshore.

O'Neill Peak, a thickly wooded cone, 401 feet high, is the most conspicuous object in this locality.

Reefs, with depths of from 2 to 3 fathoms, extend ¾ mile from the shore under this peak, and for a distance of 2½ miles northeastward of it, and the coast in the vicinity should not be approached closely, especially in fine weather, when the dangers are not breaking.

Bonambi Mission.—A steep reddish bluff, 330 feet high, and wooded on its summit, is situated nearly 3 miles northeastward of O'Neill Peak, and at 1 mile northeastward of the bluff is Bonambi Mission Station, with a church having a red spire, and a few houses, not easily distinguishable from seaward, in the vicinity.

Nhlabane River, about 5 miles northeastward of O'Neill Peak, is a small stream issuing from Nhlabane Lake, about 1 mile in extent; the mouth of the river is somewhat difficult of recognition, but a black bluff, 128 feet high, is situated on its western side, and close southward of this is a black bush-covered hummock, while at 1 mile northeastward of the entrance is a broad sandy valley. The river is infested by crocodiles.

Nhlabane Rock, with a depth of 3 fathoms, lies $1\frac{2}{10}$ miles south-southeastward of the river mouth.

Cone Point, 2¾ miles northeastward of the entrance to Nhlabane River, is surmounted by a small conical hill, 101 feet high, inland of which the hills are dark and thickly wooded.

Coast.—A grassy hill, having a patch of bush on its summit, is situated 1 mile northeastward of Cone Point, and 1¼ miles farther in the same direction is a bare sandhill, 348 feet high, appearing as a steep summit when seen from the eastward; from this to Cape St. Lucia, a distance of 7 miles northeastward, the hills, increasing in height to 500 feet, are covered with bush, and have ridges of sand extending from them to the coast.

Cape St. Lucia, low and sandy, has a hill rising above it to a height of 530 feet, on the seaward slope of which is an open grassy space shaped like a boat; northward of the cape are some ledges of light brown rocks, and the cape when seen from the eastward appears as a group of islands. Hills from 400 to 650 feet high and covered with bush extend northward of Cape St. Lucia, terminating in a bluff marking the entrance to St. Lucia River.

Light.—Northward of Cape St. Lucia is a tower, 25 feet in height, with black and white bands, which exhibits, at an elevation of 383 feet above high water a white group flashing light which in clear weather should be visible from a distance of 15 miles. For bearings of arc of visibility see Light List.

Current.—The general direction of the current, observed during the months of May to July, inclusive, off the coast between Durnford Point and O'Neill Peak, was to the southwestward, and at from 2 to 3 miles from the shore the rate varied between ½ knot and 1 knot, but at 11 miles seaward of Durnford Point a velocity of 2 knots was observed.

Inshore, after the prevalence for a few hours of westerly winds, the direction of the current changed to the northeastward, maintaining the former rates above mentioned, but on one occasion attaining a velocity of 1½ knots; but this northeast set quickly disappeared with a change of wind, and it rarely happened that no current was experienced.

From off O'Neill Peak to Cape St. Lucia the direction of the current was always to the southwest or a point more westerly, the velocity in the vicinity of the 100-fathoms contour line being about 3½ knots, reduced at from 1 mile to 2 miles from the shore to 1 knot or 2 knots; but southwest winds retarded and northeast winds accelerated this current.

With a smooth sea a line of ripples was frequently observed in the vicinity of the 100-fathoms contour line, the current running inshore of it with considerably lessened strength.

Winds.—In fine weather light easterly breezes by day and land breezes by night were experienced, and, as a rule, on this coast a falling barometer indicates the approach of northeast and a rising barometer of southwest winds, the latter when strong causing a high sea.

St. Lucia Bay, the slight bight formed at the entrance to St. Lucia Lake, 8 miles northward of the cape of the same name, may be recognized by a conspicuous sugar-loaf hill of sand, 200 feet high and overgrown with bush and scrub, nearly ¾ mile southward of the southern point of entrance to St. Lucia Lake, but this hill is not seen when approaching from the southward until it bears westward of 320°.

About 3¼ miles northward of the entrance to the lake is a square-topped sand hill, 330 feet high, and similarly overgrown, but not easily distinguished. Discolored water extends some distance from the entrance to the lake.

Anchorage.—The bay, exposed to winds from south-southwest, through east to northeast, has a sandy bottom, with good holding ground, the depths gradually decreasing to the shore, and a good berth is in a depth of 10 fathoms, with the Sugar-loaf Hill bearing about 235° and the square-topped hill 2°. With the Sugar-loaf bearing northward of 250° the bottom is foul. In 1884 the British naval ship *Sylvia* rode out a fresh southwest gale in this berth, but with the wind more to the southward it would be necessary to put to sea.

Landing.—The best and only place for landing is under the Sugar-loaf, as the bar at the entrance to the lake is apparently never practicable, and after northeast or east winds the heavy swell causes so much surf on the beach that landing should not be attempted, under such conditions, in ship's boats, as, if capsized, the risk to life is great, seeing that sharks are both numerous and voracious.

Northward of the entrance the breakers extend a long distance seaward, and, around the shores of the bay, even in fine weather, the surf extends from 200 to 500 yards from the beach.

St. Lucia Lake, a shallow lagoon about 55 miles in length and 10 miles in breadth, communicating with the sea by the narrow entrance just mentioned, is continued to the northward by a number of smaller lagoons, backwaters, and passages nearly as far as Delagoa Bay.

In the dry season the entrance to St. Lucia Lake is completely blocked by a dry sand bar formed by deposits from the Umvolozi River, which discharges immediately within its southern point of entrance, and which is annually swept away by the floods; probably the depth is never more than 3 or 4 feet at high water, and with heavy breakers right across.

Within the entrance the narrow channel, sometimes known as St. Lucia River, trends northward almost parallel with the coast for about 9 miles to its junction with St. Lucia Lake, and has probably a depth of about 9 feet, but is reported to be gradually silting up and tideless, and its waters, being very brackish, are quite useless for all purposes. The eastern side of the lake is separated from the sea by a strip of land about 3 miles wide, with sand hills from 300 to 500 feet high.

Coast.—About 9 miles north-northeastward of the entrance to St. Lucia Lake is a conspicuous sand slip, from whence to Cape Vidal, a further distance of 9 miles in the same direction, is a range of dark-colored, steep hills of even height. Detached rocks lie a short distance off the projecting points.

Cape Vidal, rising to a peak 500 feet high, shows a long triangular patch of sand, extending to its summit, when bearing about 227°; when seen from the southward, two reddish-colored patches appear on it.

Coast.—From Cape Vidal to Delagoa Bay, a distance of about 130 miles, the coast, trending in a northerly direction in a nearly straight line, is moderately high close to the beach, forming a continuous line of wooded hills with rounded summits, from 500 to 600 feet high, faced with sand to about half their height. A few straggling black rocks lie along the shore.

Toward Cape Colatto, near Delagoa Bay, the land is well wooded, and the interior southward of Delagoa Bay appears to be a low level country like park land, with clumps of trees here and there, but about 10 or 12 miles inland a few hills, apparently 800 or 1,000 feet high, are visible. The Lubombo Mountains run parallel with the coast at about 40 miles inland.

Leven Point, 12 miles northward of Cape Vidal, may be known when bearing northward of 250° by four sandy roads extending from the sea to the summit of the coast hills, 9 miles northward of Cape

Vidal. Havergal Hill, 21 miles northeastward of Leven Point, is a conical hill 465 feet high, with a flat top and a sandy road from base to summit, and Sordwana Road is about 3 miles northward of it.

Dangers.—**Leadsman Shoal,** a small patch of coral about 1,000 yards long, has 2¾ fathoms water, and lies nearly 1 mile from the shore and 6 miles northward of Leven Point; a 4½ fathom coral patch lies 3½ miles north-northeastward of Leadsman Shoal and about 1 mile offshore. Vessels should not approach either shoal to a less depth than 20 fathoms.

Sordwana Road, open to winds from seaward between northeast and southwest, is no better than other open anchorages on this coast, as the holding ground, which is not good, being partly rock, is worse nearer the shore, and there is considerable swell, while strong onshore winds render the anchorage untenable.

The point on the south side of the road has a dark bluff, 150 feet in height, within it, which is covered with scrub, is conspicuous from seaward, and has a flagstaff in front of it; the coast on the west side of the road, northward of it, consists of sand hills ranging from 40 to 200 feet in height.

Sordwana River, an insignificant stream, enters the sea northward of the point, its entrance being 20 feet wide, with rocky bottom; it dries 4 feet at low water, springs. This stream carries off the surplus water from two shallow lagoons a short distance inland; the first ½ mile distant from the shore, is about ½ mile in extent, covered with grass and reeds, and very shallow; the other, 4 or 5 miles in length, is but little separated at its southwest end from the northeast end of St. Lucia Lake.

The land in the neighborhood being covered with scrub, and unsuitable for agriculture, is sparsely populated as regards natives.

Beacons used for surveying purposes are situated on the shore northwestward of the anchorage.

Anchorage.—Temporary anchorage, about ½ mile offshore, in a depth of 7 fathoms, may be taken up by steam vessels in the road north-northeastward of a projecting point which affords some slight shelter, with the flagstaff on the point bearing 203°, distant about 1,500 yards. Nearly on the same line of bearing, but 700 yards farther out, there is a patch with only 4¾ fathoms.

Landing.—A reef about 200 yards in extent extends northward from the point just mentioned, affording some slight protection to the landing place, but owing to the heavy surf and rollers usually prevailing landing is generally dangerous, and at times impracticable even to surfboats.

Coast.—Sordwana Point, 8 miles northward of Sordwana Road, is rocky, and rises to a hill 485 feet high. Lava Hill, 15 miles farther north-northeastward, is a grassy hill 300 feet in height, with a sharp summit. and probably forms a good landmark. Boteler Point, 4 miles beyond Lava Hill, projects a short distance as a dark rocky cliff, 15 feet high. About 12 miles north-northeastward of Boteler Point a reef extends ½ mile offshore.

Kosi River, the entrance to which is about 50 yards wide at low water, and conspicuous from the northeastward, has a soft and sandy beach on either side, and a rocky and sandy bar, almost dry at low water, extending completely across the entrance, over which the stream is constantly running out at a rate of 4 knots when at its full strength; heavy rollers break across the bar and for 200 yards outside it.

Within the river the depths are from 2 to 3 feet, and the constant stream comes from Kosi Lagoon and Kosi Lake beyond it, the first certainly very shallow, the other probably so.

Anchorage, no better than other anchorages on this exposed coast, may be taken up off Kosi River in depths of from 6½ to 10 fathoms, but the entrance should not bear northward of 250°, the bottom having many rocky patches when southward of that line.

Landing, always difficult, and generally attended with danger. has been found practicable with the aid of surfboats and trained crews, but for ordinary ships' boats it must be considered impracticable. The best spot is about 600 yards northward of the river entrance; it should never be attempted southward of the entrance.

Oro Point, about 3 miles northward of Kosi River, is a low dark cliffy point, with Oro Peak 394 feet high, on the coast range behind it. Foul ground extends ½ mile northward of the point, and in this locality is a small creek, where landing appears to be better than anywhere in the neighborhood of Kosi River.

Beacon.—On Oro Peak is a conspicuous iron pyramidal beacon, 26 feet in height, marking the position of the boundary between British and Portuguese possessions.

Coast.—About 6 miles northward of Oro Point are three peaked hills, forming conspicuous landmarks from all directions. Florence Peak, the highest, is 390 feet high, and about 9 miles farther north is Mathonde Beacon, and 10 miles farther, in the same direction, Grassy Hill, 246 feet high, is conspicuous from the northward.

Dundas Hill, 13 miles northward of Grassy Hill, rises 240 feet above the sea, and has two sandy roads on its seaward slope. These roads cross each other diagonally, and, when coming from the southward until abreast of the hill, form a conspicuous mark.

Beacons.—Mathonde Beacon, of iron, and 16 feet in height, stands on a sand hill near the coast, at an elevation of 344 feet.

Tane Beacon, small and elevated 295 feet, is on the southwestern summit, rising over Hollond Point, and 15 miles northward of Mathonde Beacon.

Coast.—At 13 miles northward of Oro Point, foul ground, 3 miles in length, fronts a slightly receding portion of the coast to a distance of 1½ miles, and Steamer Rock, about 5½ miles northward of Holland Point, is a conspicuous mark, resembling the hull of a steam vessel low down on the beach.

Cape Sta. Maria, the southern point of entrance to Sta. Maria Inlet, has ½ mile southwestward of it a round-topped hill 289 feet high, known as Mount Colatto, and somewhat resembling a haycock. The cape is the northern extreme of the Inhaca Peninsula, which, with Inhaca (Inyack) Island and its shoals, forms the eastern boundary of Delagoa Bay.

Sta. Maria Inlet is fronted at its entrance by a bar, the southern part of which, forming the entrance channel, is dangerous, as the sea breaks frequently on it and there are dangerous rocks. Torres Point, the south extreme of Inhaca Island, is the northern point of entrance. There is a depth of 2¾ fathoms at low water on the bar and within a deep channel, with 4 to 6¾ fathoms, extends for about ¾ mile.

Inhaca (Inyack) Island is 6½ miles in length in a north-northeast and opposite direction, and about 3½ miles in greatest width; near its east coast, at 2½ and 5 miles, respectively, north-northeastward of Torres Point, are Mount Botello, 315 feet, and Mount Inhaca, 387 feet high, wooded, and with a dome-shaped summit.

The north extreme of Black Bluff, the northwest point of the island, has on its summit, partly hidden by trees, a flagstaff and a yellow barrack with red roof, and at 1¼ miles southward of the barrack is the highest part of the bluff, 177 feet high, with a red streak down its northern face.

Beacon.—On Mount Inhaca is a white masonry beacon 16 feet in height, with sloping sides and a cylindrical topmark.

Cape Inhaca, the northeast extreme of Inhaca Island, has a steep face, and a lighthouse standing on a sand hill, about 800 yards within it.

Lights.—The lighthouse on Cape Inhaca is a black iron tower, 90 feet in height, which exhibits, at an elevation of 349 feet above high water, a fixed white and flashing light, with a red sector covering Danae Shoal; the fixed light should be visible in clear weather from a distance of 22 and the flashing light from 25 miles. For bearing of red sector, see Light List.

About ¾ mile westward of the preceding, a fixed white light is shown from Inhaca white triangular beacon, 39 feet in height, and should be visible in clear weather from 8 miles.

A fixed white light, with white and red sectors, is exhibited, at an elevation of 200 feet above high water, from the barracks on Black

Bluff, and in clear weather should be visible from a distance of 6 miles. For bearings of sectors, see Light List.

Signal station.—A signal station, with which vessels can communicate by the International Code, is situated near Cape Inhaca Lighthouse, and is in telegraphic communication with Lourenço Marques.

Danae Shoal, with a least depth of 3½ fathoms on its northern end, is about 800 yards in length in a north and south direction, within the 5-fathoms contour line, and lies on a shoal with depths under 10 fathoms, 1½ miles in length in the same direction; the sea is said to have been seen to break heavily on the shoal with smooth water and in fine weather.

Shoal.—A shoal, with a depth of 5 fathoms over it, chartered at 13½ miles north-northeastward of Cape Inhaca, was searched for unsuccessfully by the British naval ship *Forte*, 1900, nothing less than 35 fathoms being obtained, but, as there may be less water in the vicinity, it should be avoided.

Clearing marks.—The yellow barracks on Black Bluff in line with the white triangular beacon, westward of Cape Inhaca, bearing 240°, leads 1 mile southeastward, and Mount Inhaca Beacon in line with Cape Inhaca Lighthouse 208° leads about ¾ mile northwestward of Danae Shoal, which by night is covered by the red sector from Cape Inhaca Light.

Anchorage may be obtained in depths of from 6 to 7 fathoms, at the entrance to Portuguese Channel, a bight in the bank extending northward of Inhaca Island, with Cape Inhaca Lighthouse bearing 136°, distant about 3 miles, but two patches of 4¾ fathoms are situated close to the anchorage.

Delagoa Bay, first discovered by A. de Campo, a captain of one of Vasco da Gama's vessels, and named Lourenço Marques after the first settler, is formed on its eastern side by Inhaca Peninsula and Island, together extending nearly 20 miles north-northeastward; from the south end of Inhaca Peninsula is a nearly similar distance in a north-northwest direction to the entrance to Espirito Santo River, at the head of the bay, the northwest shore being formed by the mainland and Chefina Grande and Pequena, two islands.

On the south side of the bay is Machangulo Bay, fronted by numerous shoals, almost entirely blocking its approach, and through the middle of the head of the bay the Maputo River discharges, while the Espirito Santo River, formed by the Tembe Umbeluzi and Matola Rivers, runs into its northwest corner. Farther notheastward on the northwest shore the Incomati River flows into that side of the entrance to the bay on either side of Chefina Grande and Pequena, the entrance to the bay, between Cape Inhaca and these islands, being 14½ miles in width.

Shoals extend northward of Cape Inhaca for a distance of about 19 miles, terminating in Cutfield Shoal, between which and the northwest shore is North or Cutfield Channel, 5 miles in width, which is the widest and deepest of any of the passages into the bay.

Buoyage—Caution.—The buoys in Delagoa Bay should not be depended on, as, although their positions as charted are from the most recent information, they may have disappeared or have drifted from the proper positions.

Magnetic disturbance.—Considerable local magnetic disturbance has been observed over parts of Delagoa Bay, the variation differing from the normal value, and, in 1907, showing the following, which values afford an approximate guide for navigation:

In approaching the bay, when in a depth of more than 15 fathoms	19° 30′ W.
In the bay, when in a depth less than 15 fathoms	18° 30′ W.
Westward of Ponta Vermelha	21° 0′ W.
On-shore at Ponta Vermelha	21° 40′ W.

The annual change of variation has altered from 5′ decreasing to 10′ decreasing.

Pratique.—Vessels requiring pratique should, when passing Cape Inhaca by night, hoist a green light, and also again before arriving abreast of Ponta Vermelha Lightbuoy; the health officer will visit mail or passenger steamers at any hour of the day or night, and other vessels up to 10 p. m.

Portuguese (Elephant) Island, on the northwest side of a drying bank which extends nearly 3 miles northward of Inhaca Island, is about 1 mile in extent, 25 feet high, and sandy, with bushes on it; Gibao (Gibbon) Point, the western extreme of a small island off its west side, is steep to, but on other sides the island has a drying bank. A leper establishment is on the west side of the island.

Cockburn Shoal—Channels.—The line of shoals extending about 19 miles northward of Cape Inhaca, is broken in several places by channels, and on the southern side of this line of shoals is Cockburn Shoal, extending for a distance of 4½ miles from the northern side of the drying bank stretching northward of Inhaca Island, the least depth on it being 1 fathom, near its northern end.

Light.—On the north end of Cockburn Shoal, ⅓ mile northwestward of the 1-fathom patch, is an iron pile structure, which exhibits, at an elevation of 39 feet above high water, a white fixed light, with white and red sectors, visible 10 miles.

South or Cockburn Channel, passing along the northeast side of Cockburn Shoal, is about ¼ mile in width between the 5-fathoms contour lines, with Middle or Hope Shoals forming its northeast side.

Middle or Hope Shoals, on the northeast side of Cockburn Shoal, have a least depth of 3 fathoms on two patches.

Middle or Hope Channel, passing between a 3-fathom patch on the north end of Middle Shoals, and a 2¾-fathoms patch on the north side, is about ⅓ mile in width.

Buoys.—A black can buoy is moored about midway through South Channel, on its southwest side.

A conical buoy, surmounted by a triangle, is moored on the north side of Middle Channel, immediately southward of the 2¾-fathom patch.

Domette Shoal, with a least depth of 2 fathoms, and 3⅝ miles northward of Middle Channel, is separated from the 2¾-fathom patch of Middle Channel by a passage, in which there are depths of from 3¼ to 5 fathoms, with a detached patch of 2¾ fathoms in it, nearly 1 mile southward of Domette Shoal.

Paiva Manso Shoal, with a least depth of 2¼ fathoms, lies about 2½ miles northward of Domette Shoal, the channel between having depths of from 3¼ to 3½ fathoms, with patches of 2¾ and 3 fathoms in it.

Cutfield Shoal, having a least depth of 2 fathoms, is nearly 2 miles northward of Paiva Manso Shoal, the channel between having from 3¼ to 4 fathoms, with a patch of 2½ fathoms in it.

North or Cutfield Channel has general depths of from 6¼ to 10 fathoms, the deeper water being toward Cutfield Shoal; from 1 mile to 2 miles off the mainland side of the channel are two patches of 5 fathoms.

Mount Cutfield, 180 feet high, situated near the shore, about 6½ miles northward of Cutfield Shoal, shows a bushy top from seaward, and when westward of Cutfield Shoal a large streak of sand appears down its side, while when in the channel within the shoals and with it bearing about 0° it shows two peaks.

Beacon.—On Mount Cutfield is a white pyramidal beacon, surmounted by a black triangular topmark, pointing downward, the whole 40 feet in height.

Depths.—South or Cockburn Channel, usually preferred by vessels coming from the southward and suitable for those of moderate draft, has depths of from 19 to 21 feet on the leading marks, but its bar is subject to change, and the least depth in 1914 was reported to be 24 feet.

In Middle or Hope Channel, nearly always used by mail steamers and merchant vessels from the northward and more adapted for deep-draft vessels, a least depth of 27 feet can be obtained.

North or Cutfield Channel has from 5½ to 10 fathoms water.

Lourenço Marques, the port formed by the estuary of the Espirito Santo or English River, is approached through Delagoa Bay, where it is considerably encumbered by shoals. The southern side of the approach in the bay is formed by the drying flats which front Machangulo Bay and the entrance to Maputo River, and on the north and northwest sides by the coast extending south-southwestward for 19 miles from Mount Cutfield to Macaneta Point, the northern point of entrance to Incomati River.

Chefina Grande, the northeast point of which forms the southwest side of the entrance to Incomati River, is about 4½ miles in length in a northeast and opposite direction; low, sandy, with some hummocks, and covered with dense bush. The lower part of the island is white sand and is difficult to distinguish from the mainland behind it.

Beacon.—On Timpson Point, the southwest point of the island, is a white beacon consisting of a column, which formed a portion of an old light tower, and is surmounted by a pole. A house, 100 yards westward of the beacon and having a galvanized roof, is said to be a good mark, being visible about 10 miles in clear weather.

Chefina Pequena.—The entrance to Incomati River, between the points mentioned, is about 8 cables in width, with a depth of 1½ fathoms on a bar fronting it, and about ¾ mile within the entrance to the river is the south extreme of Chefina Pequena, which island extends northward for about 2½ miles, with a greatest width of 1 mile. Its southern part is surrounded by a bank uncovering at low water. Another channel of entrance to the river runs close along the northwest side of Chefina Grande.

Northwest shore.—From the western point of the entrance to the Incomati River the shore of the bay trends southwestward for 9 miles to Ponta Vermelha, a bold red bluff, 102 feet high, rising abruptly from the water, and the northern point of entrance to Espirito Santo River, and midway is a high sand hill. Ponta Mahone, the south point of entrance to the river, and 2½ miles southward of Ponta Vermelha, is cliffy.

Approach—Dangers.—The approach to Delagoa Bay from seaward is either by South or Cockburn, Middle or Hope, or by North or Cutfield Channels, the latter the deepest and widest. Lourenço Marques may be approached through three channels, named, respectively, South and North Passage and Chefina Grande Passage.

South Passage.—From the southwest side of Cockburn Shoal a line of shoals, with depths under 5 fathoms, extends southwestward until it joins Great Maputo Flats, off Maputo River, and about midway is Gibao Shoal, 1¼ miles westward of Portuguese Island, having a least depth of 1¾ fathoms over it.

This line of shoals and Great Maputo Flats form the south side of the South Passage leading to Espirito Santo River, but northward of Great Maputo Flats, and on the south side of South Passage, is also Captain Shoal, detached, about 1 mile in extent, and with a least depth of 2 fathoms. The above line of shoals and Great Maputo

Flats also form the northwest side of Great Channel, leading to Machangulo Bay.

The only danger on the north side of South Passage, and separating it from North Passage, is Serra Shoal, about ¾ mile in length in a northeast and opposite direction, and with a least depth of 2¼ fathoms.

North Passage, entered about 2 miles westward of Cockburn Shoal pile light structure, has on its northern side Chefina Grande Bank, and Fawn, Ribeiro, and Passage Shoals.

Chefina Grande Bank.—From Chefina Shoal, extending about 1,200 yards southward of Timpson Point, the southwest extreme of Chefina Grande, the 3-fathoms contour line trends in an east-northeasterly direction for 8 miles, and then, curving round northward and northwestward, forms within it Chefina Grande Bank and Incomati Flats, the east extreme of the former being 4 miles east-southeastward, and of the latter nearly 5 miles eastward of Macaneta Point; the outer part of Chefina Grande Bank frequently breaks.

Fawn Shoal—Ribeiro Shoal.—The 5-fathom contour line passes at a distance of about 1½ miles to the southward of Chefina Grande Bank, and within its eastern extreme is Fawn Shoal, with a depth of 2¼ fathoms, and the easternmost of several detached patches, of from 1½ to 3 fathoms, extending west-southwestward from it for 2 miles to Ribeiro Shoal (Lech Reef), which is close to the edge of the 5-fathoms contour line, and has a least depth of 1½ fathoms.

Passage Shoal, a sandy patch about ¾ mile in length in a northwest and opposite direction, has a least 2 fathoms, and lies 1 mile west-north westward of Ribeiro Shoal. The tidal stream, especially that of the rising tide, sets toward Ribeiro Shoal.

Clearing mark.—The yellow barracks on Inhaca Island in line with Gibão Point, bearing 156°, leads eastward of Fawn Shoal, Chefina Grande Bank, and Incomati Flats.

Lights.—A green fixed light, with a red sector, is exhibited from a beacon on the southern edge of Ribeiro Shoal.

On the southern edge of Chefina Shoal is a cement pile structure, which exhibits, at an elevation of 26 feet above high water, an unwatched flashing light, with white and red sectors, visible in clear weather from a distance of 8 miles, but the flashes show irregularly.

Buoys.—Fawn Shoal is marked by a red conical buoy surmounted by a staff and triangle and moored 800 yards eastward of it.

A black can buoy is moored about 1⅔ miles eastward of Chefina Shoal pile light structure.

Chefina Grande Passage, between Fawn and Ribeiro Shoals, on the south, and the edge of Chefina Grande Bank, on the north side, is about ⅔ mile in width, but it is obstructed at its western end by Passage Shoal.

Depths.—South Passage has depths of from 5¾ to 9 fathoms on the track recommended, which is shown by a pecked line on the plan, until nearing the 5-fathom contour line outside the bar, and North Passage has from 5½ to 9 fathoms on a similar track, while Chefina Grande Passage has from 4¼ to 9 fathoms water, avoiding Passage Shoal.

Espirito Santo River, 2½ miles in width at its entrance between Ponta Mahone and Ponta Vermelha, the former having two faces of red earth sometimes showing well against the dark foliage, and the latter, a bold red bluff, rising abruptly to 102 feet, is fronted by a bar, continued for about 6½ miles eastward, by Polana Shoal, between the north edge of which and the south side of Chefina Shoal is the entrance to the river through Polana Channel; within the bar the river deepens, and is about 600 yards in width, forming the port of Lourenço Marques.

Light.—On Ponta Vermelha, the northern point of entrance, is a cylindrical stone tower, 59 feet in height, which exhibits, at an elevation of 157 feet above high water, a fixed light, with white and red sectors; it should be visible in clear weather from a distance of 17 miles, and in very favorable weather it may possibly be visible from eastward of Cockburn Shoal.

Pilots may be obtained, although reported to be not very reliable, the pilot hulk flying a flag with a dark P on a white ground by day and showing a white fixed light by night, being generally moored inside Cape Inhaca, and the pilot boats, which are schooners, showing letter P in white on a black ground, both on the mainsail and flag, cruising, weather permitting, a few miles northward of the cape and outside Middle Shoals. Pilotage is compulsory for merchant vessels.

Tugs.—Two tugs are available.

Directions—South Channel.—If intending to enter the bay by the South Channel, Cape Inhaca should be rounded at about 2 miles distant, steering about 284° until Cape Inhaca Lighthouse and the beacon westward of it, from which a light is shown, are in line, bearing 143°, when alter course to 323°, with these marks astern, which should lead through the channel, but passing close westward of patches of 2¾ and 3 fathoms, and eastward of a patch of the former depth, southward of which is a black can buoy; when nearing this buoy the marks should be slightly opened to avoid the patches on the east side.

When steering on the above marks it should be remembered that the tidal streams set obliquely across the channel, the west-going stream being that of the rising and east-going stream that of the falling tide, and when the pile light structure on the north end of Cockburn Shoal bears about 240° that shoal may be gradually rounded, and when Black Bluff is open westward of Cockburn light structure, bearing 164°, the vessel is westward of Cockburn Shoal. Reliance should not be placed on positions obtained by cross bearings, as in some parts of the bay the compass is reported to be very sluggish; therefore angles should be used for fixes as much as possible.

North and South Passages.—From the foregoing position there is the choice of proceeding to the port or anchorage off the bar by two passages, of which North Passage is the most direct, but South Passage is that generally taken by the pilots; Chefina Passage is not buoyed and is obstructed by Passage Shoal.

If intending to use South Passage, from the last position steer 235° until the beacon on Ponta Vermelha is in line with the light tower on that point, bearing 260°, which leads between Captain and Serra Shoals to an anchorage southeastward of Chefina Shoal light structure.

By the North Passage, from the position westward of Cockburn Shoal, steer 245° for about 1 mile to a position southward of Fawn Shoal Buoy, and then alter course to 252°, passing southward of the light structure on Ribeiro Shoal, to an anchorage about 2 miles eastward of Chefina Shoal light structure.

By night.—A vessel entering by North Passage will be guided by bearings of Ponta Vermelha Light, nearly ahead, and by the lights shown from the light structures on Ribeiro and Chefina Shoals, as well as the lightbuoys.

Middle Channel.—The Middle Channel is approached steering about 284°, and a depth of 27 feet will be maintained when approaching from the southward by preserving an angle of about 39° between Cape Inhaca and Gibao Point, until the former bears 159°; when leaving the red conical buoy to the northward, about 300 yards distant, steer 219° for Cockburn Shoal light structure until within ½ mile of it or the marks for Cockburn Channel come in line, when the previous directions to the westward may be followed.

The tidal streams set almost directly across Middle Channel, and, with the west-going stream, care is necessary not to be set northwestward of a line joining the red buoy and Cockburn Shoal light structure until the marks for Cockburn Channel are in line, but the foregoing drections should be used with caution, on account of the changing nature of the shoals.

By night.—Cockburn Shoal light structure, bearing 222° by day if coming from the north, or the light on the same bearing by night, will lead through Middle Channel in a least depth of 27 feet.

North Channel.—Vessels preferring to enter by the North Channel, after passing from a mile to 2 miles eastward of Cape Inhaca Lighthouse, should steer about 350°, leaving Danae Shoal on the east side, and taking care not to bring the lighthouse to bear to the southward of 176° until Cutfield Hummock bears 324°, when it may be steered for, its approximate distance being obtained by means of a vertical angle of the summit, which is 180 feet above high water.

When about 2½ miles from the beacon the course may be gradually altered to the southwestward, to bring it to bear 357°, and steering 177° keep it on that bearing as a stern mark as long as the beacon remains in sight, or until Cockburn Shoal light structure bears about 157°, when steer about 169° for the position already mentioned to the westward of Cockburn Shoal, observing that the yellow barracks on Black Bluff, in line with or open eastward of Gibao Point, bearing about 156°, leads eastward of Fawn Shoal.

Anchorages.—The anchorage recommended for deep-draft vessels is in depths of from 6 to 8 fathoms, with Chefina Shoal light structure bearing 295°, distant about 2½ miles; or if of moderate draft, anchorage may be taken up somewhat closer to the light structure in from 4¾ to 5 fathoms, with it bearing about 308°, distant 1¾ miles.

There is also anchorage on the north side of the North Passage, with Chefina Shoal light structure bearing 263°, distant 2 miles, in depths of from 4½ to 5 fathoms, or in about 3¼ fathoms, near the entrance to the dredged channel.

Bar—Polana Channel.—Polana Channel, dredged to a depth of 21 feet, 328 feet in width, and nearly 4 miles in length, passes over the bar, and is entered about 2 miles westward of the pile light structure, southward of Chefina Shoal; the bottom is soft mud, and the channel is in course of being deepened to 26 feet. On the south side of the bar, Ponta Mahone Shoals, with depths of and under 1 fathom, extend 2 miles northeastward of the point of the same name.

Leading lights.—At Catembe, on the south side of the river, about 2½ miles within Ponta Mahone, two leading lights, for use in passing through the dredged channel of the bar, are situated; they are 2,040 yards apart, and in line bearing 239°.

The rear light, white fixed, with red sectors, is shown at an elevation of 95 feet above high water, from a white iron tower, 33 feet in height, and having near it a small house with a red roof; the light should be visible in clear weather from a distance of 9 miles. The front light is red fixed, the light structure being a beacon situated on the shore bank extending from the southern bank of the river.

Beacons.—About 400 yards westward of Ponta Vermelha is a triangular beacon 48 feet in height and 136 feet above the river, the white top of which shows a pale yellow apex to seaward and bluff-colored towards the port, but when it is in line with the lighthouse this is not easily seen.

A white triangular beacon, 42 feet above the river, is situated about 200 yards in front of the rear leading-light tower.

A cylindrical beacon, 12 feet in height, stands just within the edge of the mud flat westward of Ponta Vermelha.

Lightbuoys.—Polana Channel is marked by lightbuoys as follows, those with red lights being on the port, and those with green on the starboard hand:

A black can buoy, showing a red fixed light, on the south side of the entrance of Polana Channel.

A lightbuoy, exhibiting a red fixed light on the south side of the channel, and about 1 mile eastward of Ponta Vermelha.

A red buoy, showing a green fixed light, visible 2 miles, at the inner end of Polana Channel.

Beacons.—In addition to the beacons above mentioned the limit of the dredged channels on either side is indicated by a red pole beacon in front, placed on each side of the channel, and two small white triangular beacons on the shore on each side of the lighthouse in the rear.

Port.—The port of Lourenço Marques, formed by the estuary of the Espirito Santo River, fronts the town of Lourenço Marques, Gorjao Quay occupying nearly the whole of the frontage on that side; it is 3,469 feet in length, of which 2,197 feet will accommodate 4 vessels of 30 feet draft, while the remaining 1,272 feet will allow 3 vessels of 25 feet draft to lie alongside at low-water springs.

The quay, which is lighted by electricity, has several lines of railway on it so that trains can run alongside vessels, while it is equipped with several electric cranes, the largest lifting 20 tons, and four transporters are available; a steam launch is fitted with an apparatus for the disinfection of holds of vessels. The customhouse and port captain's office are eastward of Gorjao Quay, and on the south bank of the river, which is chiefly mangroves, are disused naval workshops.

Harbor works.—It is proposed to extend the quay to the westward for an additional length of 4,328 feet, which will enable 10 vessels of an average length of 430 feet to berth alongside; the wooden quays are being replaced by concrete. A boat camber for motor boats, etc., is under construction.

Harbor lights.—Two green lights are shown at the customs landing, and a red light from the naval workshops at Catembe.

Directions.—From the anchorage outside the bar, steer for the houses on Somerschields concession, on the northern slope of the high ground of Polana, bearing 271° until the white iron light tower at Catembe is in line with the white beacon fronting it, bearing 239° true, and proceed through the dredged channel on these marks, leaving the black lightbuoy at the entrance and the intermediate lightbuoy (both red lights) on the south, and the lightbuoy (green light) southward of Ponta Vermelha to the northward.

By night, a vessel will be guided by bearings of Chefina Shoal light when approaching the dredged channel, as well as the light-buoys, and the leading lights in line, bearing 239°, will lead through Polana Channel.

Anchorages.—The anchorage for vessels of war is in the southeast part of the port, off and southeastward of the southeast end of Gorjao Quay, the depths being from 36 to 48 feet.

The anchorage for merchant vessels, in depths of from 48 to 78 feet, is northwestward of a line crossing the port from the northwest end of Gorjao Quay. The space fronting Gorjao Quay, and between the above anchorages, is prohibited as anchoring ground.

The quarantine anchorage is on a line joining Ponta Vermelha and the leading light beacons, as near the southern shore as possible, and vessels laden with explosives must anchor in that portion reserved for vessels of war, but not less than ½ mile from any other vessel.

Vessels ready to leave the port, or waiting for the tide, may anchor in the entrance to the port, southeastward of the line of the leading marks for Polana Channel, and not less than 600 yards to the southward of the light buoy off Ponta Vermelha.

Vessels can make fast alongside the quay up to 11 p. m., but if wishing to go alongside after that hour notice must be given to the secretary of the port commission before 7 p. m.

Pratique.—Vessels requiring pratique should hoist a green light when passing Cape Inhaca, and also when abreast of Ponta Vermelha. The health officer boards vessels, and no communication with the shore is permitted until he has done so, the regulations being very stringent.

Tides.—It is high water, full and change, in South or Cockburn Channel, at 4 h. 48 m., springs rise 9¾ feet; at Chefina Grande, at 4 h. 51 m., springs rise 12 feet; and at Lourenço Marques, at 4 h. 56 m., springs rise 12½ feet, neaps rise 7½ feet. The age of the tide is about 2 days, and there is considerable diurnal inequality.

Tidal streams.—Seaward of the line of shoals fronting the bay the north-going stream, or that of the rising tide, sets with a velocity of 2 knots, with a strong indraft toward South or Cockburn Channel, across which it sets obliquely, necessitating caution to guard against it when passing through; the other stream sets in an opposite direction.

Within the line of shoals the southwest-going stream, or that of the rising tide, setting through North or Cutfield Channel, over Chefina Grande Bank, enters Espirito Santo River with velocities of from 1 knot to 3 knots, the other stream setting in an opposite direction.

Winds.—From October or November to April, although the hot and rainy season, the weather is mostly fine, accompanied by strong sea breezes of a force from 4 to 5, and succeeded by light land winds by night, but sometimes the sea breeze only decreases in strength for two or three nights running; after some days of fine weather the sea breeze fails, and rain accompanies south or southwest winds.

Gales from southwest of 36 hours' duration are not infrequent, the wind then drawing to the southward, and the weather becoming fine at southeast, after which the wind draws gradually to northeast, continuing fine for a few days, and then undergoing a similar change. Bad weather always comes on with winds between west and south, improving as the wind draws to east; an unusual gale from south, of hurricane force, was experienced in the middle of October, 1903.

From April to October the sea breezes blow with less force, calms are more frequent, and rain only falls on from 2 to 6 days in a month, whereas in the opposite season, it may fall on about 11 days in the same period.

Weather forecasts.—Information regarding the probable weather likely to be experienced in the Mozambique Channel can be obtained at the port office, being telegraphed there from Mozambique.

Town.—Lourenço Marques, standing on the northern bank of Espirito Santo River, about 1¼ miles within Ponta Vermelha, is the capital of the Southern Province of Portuguese East Africa. Swamps which formerly surrounded the town have been filled up and the land reclaimed, and amongst the most conspicuous buildings are a church on the hill behind the lower town, with a large hospital near it, the capitania buildings, the treasury, post and telegraph offices, municipal buildings, and court of justice, all being prominent.

The town, with a population of 13,353 in 1912, of which number 5,324 were white and 668 British subjects, is lighted by electricity and has good macadamized roads, with a service of electric trams in them.

Communication.—Steam vessels visiting the port belong to the Union Castle, Clan, Aberdeen, Prince, British India, Chargeurs Reunis, and Empreza Nacional de Navegação lines. Other steamers call at irregular periods.

The railway to the Portuguese frontier, a distance of 57 miles, is continued to Pretoria, the total distance being 346 miles, from which there is railway communication with all parts of South Africa. Besides this line there is a branch to Barberton and the De Kaap gold fields. A railway to the borders of Swaziland is under construction and nearing completion in 1913.

Submarine cables connect Lourenço Marques with Port Natal and with Aden, via Mozambique, and land lines give telegraphic communication with all parts.

Coal and supplies.—About 1,200 tons of Transvaal coal are kept in stock, and large amounts are available at very short notice. About 14,000 tons are imported annually. Coaling is carried on by baskets and about 400 tons could be put on board in 24 hours, there being about 30 lighters and a coal wharf 3,000 feet in length, with a depth of 24 feet alongside. Collieries have been opened on the border, 55 miles from the port.

Fresh meat, bread, and vegetables can be procured, the latter being plentiful and mostly grown in the neighborhood. Fish are abundant and good. The supply of water—of excellent quality—is abundant, and mains are laid on the quay for shipping, which are supplied at 2s. 8d. per ton for drinking and 1s. 9d. for boiler purposes, but at the anchorages 6s. is charged.

Repairs.—Small repairs might be effected at the Government workshops at Catembe. A steam launch is fitted with Clayton apparatus for the disinfection of vessels' holds.

Hospital.—In addition to the free hospital, containing 300 beds, a large hospital is in course of construction in the upper part of the town.

Time signal.—A time signal, made by means of an electric light, exhibited on Gorjao Quay, and worked from the observatory, is made at mean noon of the thirtieth meridian east of Greenwich, and subsequently every three hours, both by day and by night. The light, exhibited 5 minutes before the hour, is extinguished exactly at the hour.

Trade.—The exports in 1913 were valued at $3,847,954, the transit trade amounting in value to $21,275,115; the imports, principally timber, machinery, railway material, and general merchandise, were valued at $5,224,772. In this year 577,248 tons of Transvaal coal were exported.

In the same year the port was entered by 779 steam and 11 sailing vessels, with aggregate tonnages, respectively, of 2,605,107 and 19,127 tons.

The retail trade is chiefly in the hands of Europeans, but a large business is transacted by Banians or Hindu traders.

Climate.—The climate is very pleasant from May to September, when there are bright sunny days, and the temperature in the shade seldom rises above 80° or falls below 60° F., but the other half of the year contrasts most unfavorably with this period, as typhoid fever has then been more or less prevalent. Improvements that have been made in filling in the swamps, reclaiming the foreshore, draining, and road making, together with the abundant supply of pure water, are stated to have considerably improved the health of the town.

Port Melville, southwestward of Portuguese Island, and between the drying bank, on which that island stands, and a narrow shoal extending for a distance of 2 miles southward from about ⅓ mile southwestward of Gibao Point, is about 400 yards in width between the 5-fathom contour lines on either side, and has depths of from 8 to 11 fathoms, affording good shelter from all winds but those from southwest, which raise a sea at the anchorage.

Directions.—Having arrived at the position westward of Cockburn Shoal Light Structure, by one of the channels through the line of shoals already described, keep to the southwestward until Gibao Point is midway between the yellow barracks on Black Bluff and Mount Inhaca, bearing about 125°, and steer on these marks, which will lead, in a depth of 4½ fathoms, over the shoal ridge connecting Gibao Shoal with the southwest patches of Cockburn Shoal.

When about 400 yards distant from Gibao Bluff, and the yellow barracks bears 150°, alter course for them, anchoring in a depth of about 10 fathoms, over sand, with the northernmost house on Portuguese Island bearing 70°; but if proceeding farther southward to the anchorage off Black Bluff, a vessel should not pass westward of the line joining Cockburn Shoal Light Structure and Gibao Point, bearing 359°, which line may be used as a stern mark to the anchorage; but these directions should be used with caution, as the shoals in the vicinity appear to be of a shifting nature.

Supplies.—Some small supplies may be purchased from the natives on Inhaca Island, but bullocks are scarce; if water is required, wells should be dug 10 or 12 feet deep, about 70 yards inland, on the western and highest part of the island, or from 6 to 8 tons might be obtained in a day by sinking casks in the sand. A well of good water is situated near the beach. A detachment of soldiers is stationed at Black Bluff.

Machangulo Bay, on the southeast side of Delagoa Bay, is obstructed by shoals, through which are three channels; of these Inhaca Channel is the easternmost, Direct Channel the middle, and Great Channel the westernmost.

Depths.—Inhaca Channel, approached through Port Melville, has a least depth of 1¾ fathoms; Direct Channel has about the same depth, and both channels pass over a bar of 1½ fathoms at their inner part. Great Channel, which bifurcates some way within its entrance, has about 2 fathoms, and the tracks through these will be seen marked by pecked lines on the plan. The anchorage, in a narrow space at the head of the bay, is in a depth of about 4¼ fathoms.

Maputo River, about 9 miles northwestward of Machangulo Bay, is approached through Maputo Channel, between Great Maputo Flats and the shore bank, under 3 fathoms, extending nearly 5 miles eastward of Ponta Mahone; it is said to be navigable for boats for about 60 miles until the month of June, but after this, during the dry season, they would probably not be able to ascend beyond the limit of tidal influence.

For about 17 miles the banks of the river are of low alluvial soil, lined with mangrove forests, but beyond that is a fine open country, with sandy soil, and river banks about 6 feet high; these plains extend about 2 miles within the banks on either side, with some fine ranges of hills, before reaching the foot of the Lubombo Mountains. Moham is situated about 35 miles, and Upanhlain Drift, about 130 miles from the mouth, is considered to be the head of navigation.

Buoys.—Maputo Channel is marked by the following buoys:

A fairway buoy, conical and surmounted by a triangle, at the entrance.

A can buoy, surmounted by a cylinder, on the east side of the fairway, about 5 miles within the preceding.

Two conical buoys, surmounted by triangles, on the western side of the fairway, one at the entrance to the river and the other about 1 mile within it.

A can buoy, surmounted by a cylinder, on the east side of the fairway of the river and ½ mile within the last of the above buoys.

Depths.—Maputo Channel has a least depth of 3¼ fathoms, but a bar of 2¾ fathoms crosses the river about 1 mile within its entrance. In the river there is a depth of 4 fathoms at high water, and during the month of April a depth of 18 feet was obtained for 20 miles from the entrance, after which an average of 6 feet for 50 miles, then 4 feet for a farther 30 miles, and about 2 feet for the last 30 miles, gradually shoaling above this to a ford about 2 miles beyond the junction with the Usutu River.

Tidal stream.—The outgoing stream runs strongly at the entrance to the river for about 7 hours, and in some of the bends it attains velocities of from 2½ to 5 knots.

Espirito Santo River, formed by three tributaries, the Tembe, Umbeluzi or Dundas River, and the Matola River, all entering it about 8 miles from its mouth, from their junction with it flows first northeastward and then southeastward, and from 13 fathoms, its greatest depth, in front of the town of Lourenço Marques, it decreases in depth to 2¾ fathoms below its head.

Tembe River, the southernmost tributary, can be navigated by vessels drawing 13 feet for 19 miles, and those of 6 feet for 60 miles from its mouth, the depths for the last 25 miles of this distance being 9 feet and very regular.

Some of the land is under cultivation, and fresh water is abundant; that in the river is said to be drinkable in the upper part, but it is salt in the lower reaches.

Umbeluzi (Dundas) River, the middle tributary, is navigable for large boats as far as Bombai, about 10 miles from its entrance, near which is a ford only passable by boats at high water; the river is 80 yards in width a short distance below the ford, and the water is fresh a few miles from the river entrance.

Matola River, the northernmost tributary, and narrower and shallower than the Tembe River, is 320 yards in width and 16 feet in depth at its entrance, while at 8 miles above its width diminishes to 30 yards and its depth to 8 feet, above which boats can only ascend a short distance.

Incomati (King George) River, entering Delagoa Bay immediately to the northward of Chefina Grande Island, rises near Leydenburg in the Lumbombo Mountains.

The entrance, fronted by Chefina Grande Bank, extending 4½ miles eastward of it, has a channel on the north side of this bank and also one passing along the western side of Chefina Grande Island, and from its mouth it has a general northerly direction, with several windings, passing about 3 miles westward of Mount Cutfield.

For some distance from the mouth the banks are more or less bush covered or mangroves, and higher up, on the western side, is a ridge of high land, approaching the river at a few points, but frequently separated from it by flat marshy tracts of country, several miles in width, and densely covered with a coarse species of guinea grass from 5 to 6 feet in height.

On the eastern side are also flats of a similar kind, which at the highest point to which the river has been ascended were only bounded by the horizon; for many miles of the upper river there is no timber, except here and there a straggling fir tree, bent over the river by the force of the southeast winds. Care is necessary when landing on the banks, which can not be easily penetrated, except where the grass has been burnt, as in places they are honeycombed with pits as traps for hippopotami and other animals.

The least depth over the bar of Incomati Flats and northward of Chefina Grande Bank is 1½ fathoms, and in the river, which has been ascended for between 120 and 140 miles in a sailing cutter, the depths throughout were from 12 to 18 feet in the fairway and from 6 to 9 feet near the banks, which were frequently brushed by the cutter's mainsail.

At Magud's Kraal, about 30 miles from the mouth, is a ferry, and here the river has a navigable deep-water channel for almost its entire breadth, sugar cane, cotton, and indigo growing well on its banks.

Coast.—From Mount Cutfield the coast, curving round to the eastward, consists of sand hills, from 150 to 200 feet high, for a distance of 17 miles, when near Mabamba is a long, bare sandy ridge having four small cones, 290 feet high, which form a conspicuous landmark; within this coast are Lakes Pate and Muandje.

Beacons.—At Mabjechine, 6 miles northeastward of Mount Cutfield, is a beacon on a hill 235 feet high.

A white masonry beacon, surmounted by a white cylinder, stands on the 290-foot hill of the long bare sandy ridge near Mabamba.

Several black pyramidal surveying beacons, about 19 feet high, are erected on hills near the coast between Delagoa Bay and Cape Bazaruto.

Lagoa River, flowing out of Lake Huendje, is 26 miles eastward of Mount Cutfield, and between Lagoa and Limpopo Rivers the sand hills increase in height to from 380 and 430 feet; at the western point of the latter river is a red-topped sand hill, whilst at 17 miles eastward is Salmon Cliff, backed by cultivated and grassy hills.

Huendje Lake.—Lagoa River, forming the entrance to Lake Huendje, is 27 miles northeastward of Mount Cutfield, its western point rising to a sandy hill 245 feet high. When near the shore the lake is easily identified by the limestone cliffs or blocks of stone, about 80 feet high, facing the sand hills, extending some distance on either side of it, and forming a gap about 500 feet in width. This break in the cliff has caused the lake to be mistaken for a river, whereas it extends back only about 3 miles, and is but a ravine full of water, separated from the sea by a ridge sometimes 30 feet above sea level.

During the survey in 1884 a narrow stream of water was visible communicating with the lake at half tide, but it was breaking heavily right across the entrance; the sand hills in this neighborhood are of a reddish color, differing from those about Delagoa Bay.

Lagoa Shoal, the eastern extreme of which is 4 miles southward of Lagoa River, and near the northern approach to Delagoa Bay, is a ridge of rock and sand, extending 5 miles southwestward of its eastern end, with a width of 500 yards, and lying parallel with, and between 4 and 5 miles from, the shore. The least depth of 2¼ fathoms is near the center of the shoal and about 66°, distant 21 miles from Mount Cutfield.

Limpopo or Innampura River, also known to the natives as the Krokodil, the Oori, the Lebepe, the Lebempe, and the Do Onoro, rises in the Cats Rand Mountains, and flows through gold-bearing land past Johannesburg and Pretoria, having a course of about 1,500 miles.

Maquitane Point, on the western side of the entrance, has several sand hills 200 feet high, the outer one being red, and forming a conspicuous mark for identifying the river; Chai Chai Point, on the eastern side, is a narrow sand spit about 12 feet high.

The first 12 miles of the river has mangrove-covered banks, above which, for about 60 miles, the country is low, level, and almost destitute of timber, but from this it gradually rises to hills and mountains in the interior and is well wooded.

Light.—On Monte Bello, a hill 278 feet high, situated 1½ miles northward of Maquitane Point, is a masonry tower 35 feet in height, which exhibits, at an elevation of 305 feet above high water, a white group flashing light, visible in clear weather from a distance of 24 miles.

Beacons.—A white masonry beacon, surmounted by a white cylinder, stands on a sand hill, 452 feet high, on the western side of the river entrance.

Two leading pyramidal pile beacons with black disks as topmarks are for use in entering the river; the lower beacon stands on the north side of Maquitane Point and the upper beacon is about 700 yards 270° from it.

Dangers—Entrance.—South Bank, forming the south side of the entrance channel, extends about 1,800 yards eastward of Maquitane Point, being about ½ mile in width at its inner part and tapering to a point.

North Bank, the continuation of a bank, partly dry, which extends about 250 yards southward of Chai Chai Point, draws off the land to a distance of nearly 800 yards when farther eastward, and between its southern edge and the extreme point of South Bank is the bar, about 200 yards in width, but the entrance channel, westward of this, narrows to a little more than 100 yards. Breakers extend about 3 miles seaward of the bar.

The river channel has a westerly direction for 1 mile from the bar and then turns sharply to the eastward, around the extreme of a bank extending ½ mile westward of Chai Chai Point, after which the channel is on the southeast side of Limpopo Bank, which dries in parts, and then turns to the northwestward.

Depths.—There is stated to be only a depth of 2 feet on the bar at low water, and it is subject to change. Within the bar the river varies in depth from 13 to 50 feet, and it is said to be navigable for light-draft steamers for a distance of about 60 miles, to Manjobo's Kraal, to which place a steamer of 6-foot draft has ascended, finding nothing less than 3½ fathoms, but at Manjobo's Kraal a crossing with sometimes as little water as 4 feet bars the river, but at the time of the visit of the above steamer the depth over it was 8 feet.

It is supposed that the river is navigable for light-draft steam vessels, even in the dry season, between Nuanetzi River and the Lipalule or Oliphant River, 100 miles apart, the junction of the latter river with the Limpopo being 120 miles from the mouth of the latter.

Buoys.—A white can buoy marks the edge of the 3-fathom contour of the bar, moored on the line of the leading beacons.

A black buoy, surmounted by a triangle, marks the north side of the narrowest part of the channel, within the bar, and two similar buoys are moored on the northwest edge of the bank extending from Chai Chai Point.

Two black buoys, surmounted by cylinders, mark the southeast side of Limpopo Bank, but it is probable that both beacons and buoys are moved to meet the requirements of the changes in the bar and channel.

Tides.—It is high water, full and change, in Limpopo River, at 4 h. 20 m.; springs rise 6¾ feet.

Tidal stream.—The outgoing stream sometimes attains a rate of 4 knots, and possibly more.

Coast.—From Salmon Cliff, 17 miles eastward of Limpopo River, to near Zavala, about 50 miles east-northeastward, the coast sand ridges are low, but some hills about 3 miles inland rise to between 400 and 500 feet, and between a hill 548 feet high, to the westward of Zavala and Zavora Point, are some hills over 600 feet. Within, and lying parallel to the coast, are several lakes, Lake Poelela, westward of Zavora Point, being the largest.

Caution.—The soundings in the vicinity of Limpopo River, and eastward as far as Zavora Point, are from imperfect surveys, so that this coast should be given a wide berth.

Shoals.—A shoal, composed of rock and coral, with a depth of 1½ fathoms, is reported to lie with its western end about 8 miles eastward of Limpopo River Bar, from which it extends about 7 miles in an east-northeast direction, at a distance of about 5 miles from the shore, and within it, about 3 miles offshore, depths of from 8 to 9 fathoms were reported (in 1895) to exist for a distance of about 15 miles.

A shoal bank of stones, which breaks heavily, and on which are situated the Countess of Carnarvon and Courland Rocks, lies about 6 miles southwestward from Foz Inhatumbo, 48 miles eastward of Limpopo River.

Zavora Point, rising to a ridge 436 feet high, 3 miles to the northward of it, has no remarkable features, except that at 1¾ miles to the northward of it is a conspicuous sandy cliff, nearly ½ mile in length, and about 15 miles northeastward a remarkable clump of trees forms a useful landmark, being the only trees in the locality. A surveying beacon stands on the summit of the ridge.

Light.—On a sand hill close to the shore of Zavora Point is a white masonry tower, 42 feet in height, which exhibits at an elevation of 233 feet above high water a white flashing light, visible in clear weather from a distance of 21 miles.

Semaphore.—A semaphore, with which vessels can communicate, is situated on Zavora Point.

Cape Corrientes, the southwestern extreme of the Mozambique Channel, is a rounded sandy point, partially covered with bushes, and rising at the back to a height of 361 feet, while the land on either side of it is somewhat higher. The cape may be recognized by detached black rocks near it, also by an islet 15 feet high 2½ miles southwestward of it, and connected with the shore by a rocky reef; the coast about the cape is bold, and safe to approach within 1 mile or less.

Current.—The current nearly always runs to the southward at rates of from 1 knot to 2 knots an hour, but in December, 1884, at 1½ miles off Cape Corrientes the British naval vessel *Sylvia* found the current setting southward at the rate of 3 knots, although within 1 mile of the shore; at 6 miles to the southward there was no current, while at a farther distance of 8 miles to the southward and 1½ miles offshore there was a counter set of 1 knot an hour. The currents were found to be stronger off the cape than on any other part of the coast, though considerably influenced by the winds, but apparently always setting directly alongshore, and never on or off.

Between Delagoa Bay and Zavora Point the British naval vessel *Astræa* experienced a slight indraft, and in August of that year the same vessel when on a passage between Zanzibar and Port Natal, and being to the southward of Zavora Point, experienced a heavy gale with a current setting about 240° 17 miles, or toward the land, during a run of 23 hours; this was probably caused by the gale.

CHAPTER VI.

MOZAMBIQUE CHANNEL.

CAPE CORRIENTES TO KILIMAN, INCLUDING THE ZAMBEZI AND SHIRE RIVERS.

Coast.—From Cape Corrientes to Cape Innamban, 14½ miles northward, the coast consists of sand hills from 200 to 426 feet high, having at a distance the appearance of chalky cliffs, and generally visible 20 miles or more; a surveying beacon stands on Gumula, a hill of the latter height. In case of being becalmed anchorage may be obtained, in depths of from 15 to 20 fathoms, at nearly 1 mile offshore, a fact of some importance to sailing vessels proceeding northward against the strong southerly current which generally prevails.

Cape Innamban, about 14 miles northward of Cape Corrientes, has a grassy summit 200 feet high, and is nearly clear of bush, and 5 miles northward of it is Burra Point, the southern boundary of Innamban Bay.

Innamban (Inhambane) Bay, contained between Burra and Algoa Points, the latter 9½ miles northwestward of the former, is almost completely filled by banks and breaking reefs, drying in places at low water, and extending out beyond a line joining these points at the bar of Innamban River, which enters the sea on the northwest side and abreast Algoa Point.

Burra Point is low, but rises at about 1 mile to the westward to a height of 230 feet in Barrow Hill, which has a sharp summit with a clump of trees on it; this hill is readily recognized from the northward, and Burra Point may be known by the light tower on it.

Light.—On a hill immediately within Burra Point is a white masonry tower, 31 feet in height, and having a green cupola, exhibiting, at an elevation of 80 feet above high water, a white fixed and flashing light, with a period of 25 seconds, the flash having 4 seconds duration; visible in clear weather for a distance of 15 miles.

Signal station.—Near the lighthouse is a signal station, with which vessels can communicate by the International Code, the signals being passed through Ilha dos Porcos to Innamban town, on the east side of the river.

Beacon.—A black pyramidal-shaped beacon, about 19 feet high, stands on Barrow Hill.

South shore.—From Burra Point the low coast forming the south shore of Innamban Bay trends west-northwestward for 2¾ miles to Barrow Point. A rocky reef extends nearly ½ mile northeastward of Burra Point, and other patches lie about the same distance offshore 1 mile farther west-northwestward.

Between Barrow Point and Makukoni Point, about 7 miles southwestward, a bay is formed receding about 3 miles to the southward, and completely filled with bank, partly dry at low water, and having channels through it. This bank extends fully 11 miles north-northeastward of the head of the bay, to the south side of the bar of Innamban River.

Makukoni Point is the northwest extreme of a low, swampy, and partly wooded peninsula, and 1¼ miles southward of the point is Belan Point, with a bay full of drying bank between. The town of Innamban stands on the small peninsula, of which Belan Point is the northwest extreme.

Ilha dos Ratos (Rat Island).—Some islets lie on the large drying bank to the north-northeastward of the peninsula, of which Makukoni Point is the extreme, the inner of these being Ilha dos Ratos, nearly circular, 800 yards in extent, 45 feet high, and situated about 1½ miles northeastward of the peninsula.

Ilha dos Porcos (Hog Island), slightly larger than Ilha dos Ratos, and nearly 1 mile northward of it, is flat and 90 feet high; both islands have coconut palms on them, and on the southeast extreme of Ilha dos Porcos is the signal station and flagstaff, by which messages from Burra Lighthouse are transmitted to Innamban.

Mafarun Islet, 1¾ miles northward of Ilha dos Porcos, and on the western edge of the drying bank, is a small sandy patch 3 feet above water, and 2 miles southeastward of it is a somewhat similar patch only 1 foot high.

West shore.—The west shore of the bay is formed by a flat and well-wooded peninsula extending 4½ miles southward of Algoa Point, its south extreme being Linga Linga Point; westward of this peninsula a creek, about 1 mile wide, extends to the northward, and on its west side, about 2½ miles to the northward of Linga Linga Point, is Mungo Point, from which the west shore of the bay and river stretches in a southerly direction for rather more than 10 miles to opposite Belan Point. Shikoki Point, at 6 miles from Mungo Point, is a remarkable sandy cliff, with Obra village 1½ miles southward of it.

Shore Bank, with depths under 3 fathoms, extends 3 miles east-north-eastward of Algoa Point to the bar of the river.

Outer anchorage.—Anchorage may be obtained in depths of from 7½ to 8 fathoms, about ½ mile southeastward of the bar, or with strong southerly winds good shelter will be found to the northward of Barrow Hill, about ¾ mile offshore, and good anchorage, over sandy bottom, may be taken up along the eastern edge of, and about 1 mile from, the bank, but there is nearly always a swell on, and vessels should be ready to leave these anchorages on any change of wind to the eastward.

Innamban (Inhambane) River, although forming a good harbor for vessels of moderate draft, and having a fairly wide entrance, is scarcely navigable for a vessel beyond the town, about 14 miles from the bar, by the channel, nor for boats more than a short distance farther, although the river is somewhat more than 1 mile in width in places; just within the northern bar, and off the town it is barely 400 yards between the 3-fathoms contour lines.

Bar.—The bar, the outer edge of which is situated 3½ miles eastward of Algoa Point, is a shifting one, moving considerably northward or southward as influenced by the wind, weather, or other causes; it has apparently two channels, divided by a central bank.

Lights.—Two pairs of white fixed leading lights, visible 10 miles, indicate the channel across the bar, but no reliance should be placed on them as they are only for the use of whaling vessels visiting the port.

Beacons.—In 1912 the beacons were as follows:

Two white leading beacons of wood in the form of truncated pyramids were situated to the northward of Algoa Point, the outer, close to the shore, being nearly 1 mile from it; the inner beacon was situated on Kosh Hill, and they were 2 miles apart, and in line bearing 292°

The Pedestal, a white triangular masonry structure, situated on the east coast of the peninsula, 2 miles north-northeastward of Linga Linga Point, in line with Double Bush Beacon, truncated, conical, with black and white bands, southward of a conspicuous tree on a 420-foot summit, and nearly 5 miles from the Pedestal, was in line with it, bearing 234°, forming another leading mark for the bar.

Two beacons, the southwestern a white stone pyramid, 44 feet high, situated on the drying bank northward of Makukoni Point, and the other a white wooden beacon, 1.3 miles apart, were in line bearing 201° leading down the outer part of the channel of the river.

A white beacon, situated on the west shore, about 2 miles west-southwestward of Makukoni Point, with another beacon having a black band 32° from it, when in line 212° formed the second leading line in the river.

Two beacons on the edge of the shore bank at Banguei Point, the front with two red bands and rear white, in line bearing 167°, formed the third set of leading beacons in the river.

Buoys.—A red spar buoy, surmounted by a sphere, is moored about ½ mile eastward of the southern entrance, and two similar buoys are the same distance northeastward of the northern channel over the bar; the channel of the river is marked by two red and two black spherical buoys, but, owing to changes in the bar and channel, these and the beacons may be moved at any time.

Depths.—In December, 1906, the depths in the southern channel over the bar were from 17 to 19 feet, and in the northern channel from 12 to 14 feet; in 1912 a steam vessel found 25½ feet in the southern channel at one hour from high water. In the outer part of the river the depths are from 30 to 50 feet, increasing to 78 feet farther south, but abreast Mafarun Islet there appears to be a bar, with depths of from 14 to 18 feet, after which they again increase to from 30 to 54 feet, the depths at the anchorage off the town being from 24 to 32 feet.

Pilots in Government employ may be obtained for the river and for other places on the coast, pilotage for the river being compulsory on merchant vessels. Pilot boats always come out across the bar on the usual signal being made.

Directions.—It will be evident, from the preceding remarks regarding the changing nature of the bar, that no stranger should attempt to cross without employing a pilot, or previously examining it, as there is always a heavy swell on it, the sea sometimes breaking across the entrance, and in such conditions only vessels with good steam power and of light draft should attempt to enter.

In 1912 the leading beacon on Kosh Hill and the beacon on the shore, 1 mile northward of Algoa Point, when in line bearing 292°, formed the leading mark for crossing the bar until Double Bush Beacon came in line with the Pedestal, about 234°, when this second leading line should be followed, altering course to 201½ when the beacons northward of Makukoni Point come in line.

This line leads up to the red buoy abreast Mafarun Islet, when passing between it and the black buoy to the southward, to get on to the line of the fourth pair of beacons, bearing 212°, which should be followed until within about ½ mile from the outer of the two leading beacons, situated on the north end of a drying bank, from which the two beacons near Banguei Point should be steered for, 167°, leading to the anchorage off the town.

Anchorages.—The anchorage for vessels of war is northward of Casa Hollandesa (Dutch house), which is situated a short distance to the northward of the church, and merchant vessels anchor between that position and the cemetery; farther to the southward are the anchorages for vessels in quarantine and for those laden with explosives.

Tides.—It is high water, full and change, in Innamban River at 4 h. 38 m.; springs rise 11 feet, neaps rise 7 feet.

Tidal streams.—The stream is strong in the river, and has a velocity of 4 knots off the town.

Town.—The town of Innamban, standing on the peninsula of which Belan Point is the northwest extreme, surrounded by coconut palms, and so not easily seen until close-to, has no public buildings to attract attention; a small wooded landing pier, which does not reach to low water, fronts it. The small fort is garrisoned by native soldiers, and the population is about 3,500.

Communication.—The port is visited by steam vessels of the Empreza Nacional de Navegacao every three weeks, and those of the British India every month. A railway to the military post of Inharrime, a distance of about 60 miles, is under construction, about 46 miles being completed in 1913; there is also telegraphic communication.

Supplies of cattle, poultry, fruit, and vegetables are readily procurable at the town, where good fresh water may be obtained by rolling casks up to wells; firewood, cut by the natives, is brought by boats from Barrow Point.

Trade.—The trade, mostly in the hands of Banians, consists of the export of local produce; it is the principal port of embarkation for natives for the Rand.

Climate.—Although Innamban is considered to be the most healthy port in Portuguese East Africa, fevers should be especially guarded against from November to May.

Linga Linga Bay, at the mouth of the entrance to the northern branch of the Innamban River, where it joins the main channel at Linga Linga Point, forms a well landlocked harbor for small vessels, the depths being 2 fathoms at low water.

Coast.—From Algoa Point to Burra Falsa, a distance of about 45 miles, the coast, from 445 to 627 feet high, has no remarkable feathures, but 10 miles to the southward of the latter point the Sylvia Range of bare sand is 374 feet high, and had a solitary tree on its southern end.

Beacons.—Black pyramidal beacons, about 19 feet high, for surveying purposes, are situated on Olengue Range, 8 miles, and on Inhoonitude, 23 miles, northward of Algoa Point, these hills being 522 and 627 feet high, respectively, but the latter beacon is not easily distinguished.

Sylva Shoal, a narrow coral ridge, which within the 5-fathom line is about 4½ miles in length, has two patches of 2½ fathoms near its northern end, and lies parallel with the shore, distant 3½ miles from it; the northern end of the shoal is 9¾ miles southward of Burra Falsa.

Current.—A strong southerly current is generally met with at less than 1 mile off Burra Falsa. When bound northward and clear of Zambia Shoal, the current is much less inshore in from 7 to 8 fathoms, and at times there is a counter set to the northward.

Burra Falsa, or Cape Lady Grey, is a low point rising to two small conical sand hills about 95 feet high, but to the southwestward of the point the land rises to 380 feet; a considerable amount of sand about the high land over the cape makes it conspicuous from the northward. Good shelter may be obtained under the cape during southerly winds, and landing might be effected at times just northwestward of it.

Beacon.—A black pyramidal-shaped beacon, 19 feet high, for surveying purposes, stands on the 380-foot hill southwestward of Burra Falsa.

Pomene River, 3½ miles northwestward of Burra Falsa, was seen from the *Sylvia* at high water, neap tides, when there was apparently a narrow boat channel into it, and within the river opened out into a large expanse of water.

Shivala Cliffs, 12 miles north-northwestward of Burra Falsa, are nearly 2 miles in length, about 120 feet in height, and of a red color, forming a conspicuous landmark.

Zambia Shoal is a coral ridge rather more than 1 mile in length by ½ mile in width, its shoalest part of 3 fathoms lying about 4 miles east-southeastward of Shivala Cliffs; the water deepens rapidly seaward of the shoal.

Africa Shoal, about 1 mile in length and ¾ mile in width, with a least depth of 2½ fathoms over sand and rock, is about 2½ miles offshore and 10 miles northward of Zambia Shoal; a passage lies between the shoal and the shore.

Beacon.—A black beacon, similar to that near Burra Falsa, is situated on Machekane, 416 feet high, and abreast of Africa Shoal.

Foul ground.—At 26 miles northward of Shivala Cliffs, off the Mejungo River, a depth of 3 fathoms was found 1 mile offshore, apparently part of a reef extending from the land; vessels should give this locality a wide berth.

Cape San Sebastian is a steep bluff, 225 feet high, which from the southward shows a small white sand patch at its upper part, while from the northward the face of the cliff shows a considerable amount of red sand from base to summit.

The coast hills terminate at 7 miles southward of Cape San Sebastian, and a sandy peninsula ½ mile wide and partially covered with straggling trees and bushes extends in a north-northeast direction for 6 miles, to nearly abreast of the cape, from which Ponta Chambure, its northern extreme, is distant about 2½ miles in a southeasterly direction. The peninsula has shallow water westward of it, and is bounded by the high land forming the cape.

Beacon.—On Chikuenine, 315 feet high, situated 5½ miles southward of Cape San Sebastian, is a black beacon similar to that on Burra Falsa.

Bazaruto Islands, consisting of four principal islands and some islets, are situated on banks extending about 36 miles north-northeastward of Cape San Sebastian, the three outermost islands being Xezine, Benguerua, and Bazaruto Islands, while Ilha Santa Carolina, or Marsha Island, the fourth, lies westward of Bazaruto Island and nearer the shore. They are Portuguese possessions, a few troops are stationed on them, and the locality is the site of the famous pearl fishery of Sofala, pearls and mother-of-pearl being now occasionally met with.

The principal establishment is on Ilha Santa Carolina, but the trade is insignificant, the small produce being conveyed by boats to Chiluan for shipment.

Banque (Bango) Islet, about 3 miles northward of Cape San Sebastian, is low and sandy, with a dark clump of trees near its center, and Chirundira, another small sandy islet, is nearly 2 miles northward of it.

Xezine (Xegine) Island, or Ilha de Magaruque, 175 feet high and about 2½ miles to the northwestward of Chirundira Islet, may be recognized by some red cliffs near the southern part, the remainder of the island being wooded to the water's edge. It has few inhabitants. Neither Banque, Chirundira, nor Xezine Island is accessible from seaward.

Benguerua Island, nearly square and about 4 miles in extent, is about 3 miles northward of Xezine Island, Molunga Islet lying between. Benguera Island is 170 feet high, sandy, and partly wooded and has several small villages on it. The island is surrounded by drying sand banks.

Beacons.—A wooded sand hill with a double summit is situated on the east side of Benguera Island, and on the southern summit, 170 feet high, is a black pyramidal-shaped beacon 19 feet high.

A similar beacon also stands on Komuhine, a hill 154 feet high, on the mainland abreast Benguerua Island.

Bazaruto Island, the northernmost and largest of the group, is 18 miles in length in a north-and-south direction, its southern end being nearly 3 miles northward of Benguerua Island. The highest part of the island, 370 feet, is about 5 miles from its southern end, and seen from the southward the island appears as a bare, sandy hogback. There is a boat passage between it and Benguerua Island, leading to the northwest side of the latter.

Beacon.—A similar beacon to that on Benguerua Island stands on the highest summit of Bazaruto Island.

Cape Bazaruto, the northern extreme of the island, has a reef extending about half a mile from its northeast side, and from its low extreme a sand spit, named Ponta de Carlos, partly covered at high water, with some islets on it and steep-to, extends 1¾ miles northwestward.

Light.—On the summit of the northeast side of Cape Bazaruto is a stone tower, with dwelling attached, and from the tower, at an elevation of 379 feet above high water, a white group flashing light is exhibited; visible in clear weather from a distance of 30 miles. For arc of visibility see Light List.

A flagstaff is situated on a hill 312 feet high near the lighthouse.

Bazaruto Bay, the space between the north end of Bazaruto Island and the western shore, is about 12 miles in width and encumbered by some large drying banks, of which Baixo de J'anjani and Baixo dos Phantasmas are the largest. The bay is entered between Ponta de Carlos and a bank northeastward of Baixo dos Phantasmas.

Ilha Santa Carolina (Marsha), on the southwest side of the bay, is low, but well wooded, with a sand hill on its northeast side, and is easily distinguished. It is the principal Portuguese establishment between Innamban and Sofala, has a small garrison, and on the approach of a vessel the Portuguese flag is hoisted near the center of the island. Good building stone is obtained on the island, and there are two good wells of water, but not available for shipping.

Light.—A white fixed light is exhibited, at an elevation of 92 feet above high water, from an iron support on a masonry pillar standing on the north extreme of the island; in clear weather the light is visible from a distance of 10 miles.

Beacon.—A black pyramidal-shaped beacon, 19 feet high, stands on the summit of Ilha Santa Carolina.

Depths.—The depths in the entrance to the bay between the banks are from 10 to 12 fathoms, and from 7 to 8 fathoms in the channel, decreasing to 3 to 5 fathoms at the anchorage near the island.

Pilots.—A pilot may be obtained to take a vessel to the anchorage at Ilha Santa Carolina; and as the channel is not buoyed, one should be employed.

Directions.—When about 3 miles northeastward of Cape Bazaruto a course should be shaped to pass about 1 mile northwestward of Ponta de Carlos Spit, from which steer about 217° midway between the banks on either side toward Ilha Santa Carolina, the light pillar and beacon on that island probably forming guides.

Anchorage.—The British surveying vessel *Sylvia* found anchorage sheltered from southerly winds on the northeast side of Ponta de Carlos Spit, and anchorage may be obtained in depths of from 8 to 10 fathoms about 1 mile off the southwest side of the bank extending in that direction from Cape Bazaruto, or in from 3 to 5 fathoms about ¼ mile off the northeast side of Ilha Santa Carolina.

Tides.—It is high water, full and change, at Cape Bazaruto at 4 h. 26 m.; springs rise 12 feet, neaps rise 7¾ feet, neaps range 3½ feet.

Coast.—The coast from abreast Ilha Santa Carolina to Ponta Macovane, a distance of about 28 miles, is little known, but depths of from 6 to 7 fathoms are charted at about 3 miles off it.

Porto Bartholomew Diaz entered between Points Macovane and Mafomeme, nearly 5 miles apart, has its channel reduced by drying banks extending from each side, that from Ponta Macovane stretching nearly 1¾ miles northward, and that from Ponta Mafomeme nearly 3 miles southward, leaving between their extremes a channel barely ½ mile in width. Ilha Movinges (Macondes) is situated on the western side of the port, and the Rio Govuro runs into its head.

Shoal.—The master of the steamer *Corfe Castle* reports the existence of a shoal with a depth of 8 feet at low water 1½ miles 97° from Beacon No. 6, Port Bartholomew Diaz.

A rock with a depth of less than 6 feet has been discovered in the approach to Port Bartholomew Diaz, 3 miles 94° from Beacon No. 3 on Pedra Point.

Bar—Depths.—The bar is subject to constant change, but in 1910 there was a depth on it of 2½ fathoms, at low water, ordinary springs. Within, the channel to the anchorage has from 4 to 5 fathoms.

Beacons.—In 1910 the beacons were as shown, the upper beacons were as shown, the upper beacons being 82 feet in height, and the lower beacons 40 feet in height.

Nos. 1 and 2 beacons, situated on the mainland, southward of Ilha Movinges, were in line bearing 247°, which cross the bar.

Beacons 3 and 4, the outer on Ponta Pedra, and the inner nearly 2 miles, 178°, from it.

Beacons 5 and 6, the outer near the residency, and the inner on a point 151° from it.

Pilot.—A pilot for the port may be obtained at Beira.

Directions.—Considering the changing character of the bar, it would be extremely dangerous for a vessel to attempt to enter, without having first secured the services of a pilot.

Beacons 1 and 2 when in line, bearing 247°, should lead across the bar, until the beacons near and southward of Ponta Pedra are in line, 178°, which leads up the channel until the beacon at the residency and that to the southward come in line 151°, which should lead to the anchorage, but these bearings may be altered.

Anchorage, in depths of from 7 to 8 fathoms, may be obtained off the residency.

Tides.—It is high water, full and change, in Porto Bartholomew Diaz, at 4 h. 40 m.; springs rise 12 feet, neaps rise 7½ feet.

Rio Sabi.—Ponta Machanga, low, with some sand hills just to the northward of it, is about 11 miles northeastward of Ponta Mafomeme, and nearly midway is the southern entrance to Rio Sabi, which, with several shallow mouths, is also entered northwestward of Ponta Machanga, and is said to be 1 mile wide in the interior, but not navigable.

It is stated to have been ascended in 1892 for a distance of 30 miles, presumably by boat, at which point the river ceased to be tidal; it was entered on this occasion by the northern or Makau Branch, which had a depth of 5 feet on its bar at low water, the entrance being ½ mile in width, and the return was made to Chiluan through a creek, branching off the Makau Branch, and navigable by boats.

Ilha Chiluan Approach.—The coast from Ponta Machanga turning north-northwestward for about 16 miles to Ponta Ingomaimo, is fronted by shallow ridges extending from 9 to 10 miles eastward, and the land being only just visible from the outer edges, care and attention to the use of the lead when approaching this locality are necessary.

A prong of bank, with depths under 5 fathoms, extends for about 11 miles in a northerly direction from Ponta Machanga, having depths of 4¾ fathoms near its extreme, but on this prong are shoals with from 1½ to 3 fathoms over them.

Misadjuana (Inverarity) Shoal, the outermost of these ridges, is about 2¾ miles in length in a northwest and opposite direction, within the 5-fathom contour line, the least charted depth being 1½ fathoms, but it is said to be nearly dry in one spot at low water; it is steep-to on all sides from depths of 7 or 8 fathoms, and no landmarks can be seen from it, but heavy breakers usually show its position. Its southeast end, with 3¼ fathoms, is 8°, distant 14¼ miles from Ponta Machanga.

Shoal.—A shoal, with a depth of 5¼ fathoms, is reported to be about 24°, distant 8 miles, from the northwest end of Misadjuana Shoal.

Ilha Chiluan (Chiloane), about 6 miles in length in a northwest and opposite direction, and 3 miles in greatest width, lies off, and partly within, the mouth of the Rio Ingomaimo; it is low, in many places only a mangrove swamp, intersected by creeks navigable by boats at high water. The principal village and residence of the commandant is on the southern side, where there is a fort and a flagstaff; the population of the island was estimated at about 2,000 in 1900, of which number 11 were Europeans.

Light.—A white fixed light is exhibited, at an elevation of 36 feet above high water, from an iron support above a white tower, situated on Ponta Singune, the northwest extreme of the island. It should be visible in clear weather from a distance of 10 miles.

Rio Ingomaimo—Channels.—Rio Ingomaimo is divided at its mouth into two channels, by Chiluan Island, the southern of these, about 7 miles in length, being entered over a bar formed between the shore bank extending 2 miles eastward of Ponta Ingomaimo, on the south, and a drying bank stretching nearly 4 miles southeastward of Ponta Inhaguaia, the southeast extreme of Chiluan Island, on the north.

Ponta Ingomaimo, the southern point of entrance, is low and sandy, and, having no mangroves, differs from other points in the vicinity. Ponta Inhaguaia, the northern point of entrance, shows as a low bluff from the northeastward.

Beacon.—A beacon, consisting of a high pole surmounted by black and white diamonds, stands on Ponta Ingomaimo.

Dangers.—South Breakwater, a bank about 3 miles in length in a north and south direction, fronts the bar of the South Channel, at a distance of about 4¼ miles eastward of Ponta Ingomaimo, and near its southern extreme is Anson Knoll, with 1½ fathoms, while Richardson Knoll, near its northern end, has only ¼ fathom. A detached patch of 3 fathoms lies southward of Anson Knoll.

Bar—Depths.—The bar of the south entrance, about 1 mile westward of Anson Knoll, is about ¼ mile in width, with depths of 1½ fathoms at low water, and within it the depths increase to 3 and 5 fathoms, to an anchorage in the latter depth, near the village at the south side of the island.

North Channel.—Shore Bank, under 3 fathoms, extends about 1¾ miles off the northeast side of Ilha Chiluan, and is nearly 2½ miles in a northeast direction from Ponta Singune, forming the southeast side of the bar of the North Channel, the opposite side of the bar being a bank extending about 7 miles from the shore on that side. This channel leads to an anchorage off Ponta Singune.

North Breakwater, a somewhat similar shoal to South Breakwater, fronts the bar, about 4¼ miles northeastward of Ponta Singune. It is about 2½ miles in length in a northwest and opposite direction and has a least depth of ¼ fathom.

Depths.—The bar of North Channel has slightly more water than the South Channel Bar, the depths being from 22 to 28 feet at high water, while inside the channel has from 3 to 5¼ fathoms to the anchorage in from 4½ to 5 fathoms off Ponta Singune. The channel along the west side of Ilha Chiluan, connecting the South and North Channels, has only a depth of about ¼ fathom in places, but with the assistance of a pilot can be used at high water by vessels of 14 feet draft, which can thus proceed to the principal village.

Pilots.—It is advisable to obtain the services of a pilot to enter, and vessels usually bring one from Innamban.

Directions.—From the southeastward, Ilha Chiluan presents no recognizable features, and it will not be in sight from the vicinity of Misadjuana Shoal, but from the northward a few coconut palms on the northern side of the island, with a large clump of trees to the eastward of them may be seen, but not much farther to the northward than North Breakwater. The North Channel is that generally used, but it is not buoyed, and the banks are liable to shift.

The following directions applied to the North Channel at the time of the survey in 1884:

Approach Ponta Singune Lighthouse with it bearing 257, until Ponta Inhaguaia bears 173°, when alter course to 308°, until the lighthouse bears 245°, when steer 272°, and on the lighthouse bearing 212°, keep it a little on the port bow until the anchorage in a depth of 4 fathoms is reached, with the lighthouse bearing about 122°, distant 500 yards.

Tides.—It is high water, full and change, at Chiluan at 4 h. 49 m.; springs rise 18½ feet, neaps rise 13 feet.

Tidal streams.—The tidal streams run from 3 to 4 knots in the entrances, setting across the North Channel, between North Breakwater and Ilha Chiluan.

Village.—The principal village on the south side of the island has a small fort and a flagstaff, and there is also a flagstaff at the village on Ponta Singune; there is little trade, and mails are sent irregularly, generally by Beira.

Supplies of goats, fowls, and eggs can be procured in small quantities, but no vegetables.

Trade.—The exports are chiefly rubber, groundnuts, and gum, and the imports cotton goods and hardware.

Boene Island, about 21 miles northwestward of Ponta Singune, and off the mouth of the Gorongosi River, is small, overgrown with mangroves, with a grove of palms on it, and is uninhabited. An anchorage within Boene Island, known as Port Boene, is about 3 miles in length by 2 miles in width, with depths of from 2¾ to 4¾ fathoms; it is frequently used by small vessels sheltering from bad weather.

Sofala River, about 12 miles northeastward of Boene Island, is 1¾ miles in width at its entrance, but this width is nearly filled by sand banks drying at low water. Ilha Inhancata, forming the south side of the entrance, and separated from the mainland by a boat channel, is nearly 2 miles in length in a north and south direction, while the northern point of entrance has on it the town and dilapidated fort of Sofala.

The land about the town is low, with scarcely any trees except some coconuts near the fort and seen before it, but in the vicinity of the river it becomes somewhat higher and less regular, with tall, scattered trees.

Bar—Depths.—The bar, situated about 4¼ miles east-southeastward of Ilha Inhancata, has a depth of about 1¼ fathoms over it, and the 5-fathoms contour line passes about 9 miles outside the entrance to the river; unless previously examined and buoyed the bar should not be attempted.

Anchorage.—It being more than 90 years since the entrance was surveyed, it is probable that several changes have taken place since, so that little dependence should be placed on the plan. An anchorage, used about 20 years later, was in a depth of 6½ fathoms, over sand, with the fort bearing about 320°, distant 7 or 8 miles, but the depths outside this were found to be irregular, shoaling sometimes suddenly from 10 to 5 fathoms, and as suddenly again deepening, so that considerable caution is necessary considering that the rise and fall of tide is about 19 feet at springs.

Tides.—It is high water, full and change, at Sofala River at 4 h. 0 m.; springs rise 19 feet, and 32 feet at the equinox.

Town.—The town of Sofala, standing on the sandy peninsula on the northern side of the river entrance, has an estimated population of about 2,000, and is the residence of a Portuguese governor; the fort, built in 1505, was the first constructed by the Portuguese on the east coast of Africa. The trade is insignificant, a small quantity of ivory, beeswax, and groundnuts being exported to Beira.

Bank of Sofala, the actual limits of which are not known, has depths increasing very gradually seaward, there being about 35 fathoms at 70 miles, and 20 fathoms at half that distance eastward of the river mouth; inside the 100-fathoms contour line it apparently follows the contour of the coast. The bottom is muddy inshore, near the mouths of rivers, changing to fine sand farther out, which becomes coarser as the distance from the land is increased, and is very coarse on the outer edge of the bank, where it deepens suddenly.

Coast.—From Sofala River the coast trends in a northerly direction for nearly 20 miles, to the entrance to the Buzi River, and is low and unsurveyed, the only landmark being a detached clump of palm trees, known as Chirora Clump, about 3 miles southward of the Buzi River; this coast should not be approached within a distance of 8 miles, as at 6 miles patches of 3 fathoms are charted.

Buzi (Busio) River, entered between the western shore, about 3 miles northward of Chirora Clump and Ponta Massique, on which are conspicuous mangroves 40 feet high, this being also the western point of entrance to the Pungue River, is said to be navigable for vessels of 9 feet draft for a distance of 25 miles; within the entrance is Ilha Tocanos, connected at low water with the Chirora shore by a bank of sand and mud, and a sand bank, drying at low water, extends about 1¼ miles southward of Ponta Massique, the bar of the river lying to the southward of this bank.

Buoys—Depth.—The bar is marked by a black sperical buoy moored 1¼ miles southward of Ponta Massique, the depth on the bar being 4 feet in 1901.

Settlements.—About 2 miles from the mouth of the river the land, rising a few feet above the swamp, is never flooded, and at 5 miles from the mouth it is cultivated and has a number of native villages. Jobo is about 13½ miles from the entrance and 1½ miles above it is a Portuguese military station, while on the banks of the river are several Portuguese settlers who grow wheat, sugar cane, rubber, and various vegetables, brickmaking being also a flourishing industry. The natives, who are peaceable and industrious, cultivate manioc, rice, and bananas.

Pungue River approach.—The land about the mouth of the Pungue River being very low can not be seen, if approaching it from the southward, until about 11 miles from it and near the fairway buoy; northward of the river a series of low sand hills covered with scrub extend along the shore.

Outer dangers.—A line of soundings in a northeasterly direction, passing about 22 miles outside of the entrance to the river, gives depths of from 9 to 14 fathoms, and within this line and about 20 miles southeastward of the entrance is a patch of 7 fathoms, with a shoal of an unknown depth about 1½ miles northward of it.

Northward of these dangers and in a direction about 94° from Chirora Clump, depths of from 4½ to 5 fathoms were obtained for a distance of 6½ miles, the outer soundings being 22 miles from the entrance, and farther westward and about 11 miles southeastward of the entrance, depths of 3 and 4 fathoms have been reported. The positions of these and other outer dangers nearer the entrance will be best seen on the chart.

Pungue River is entered between Ponta Massique and Ponta Jea, nearly 4 miles apart, the former point showing up well, making as a dark bluff, owing to the tall straight trees on it which grow down to the water's edge; Chirora Clump of three palms and the palm grove to the northward of it, being the only palms in the vicinity, will be easily recognized, and on closing the entrance to the river, Macuti Light Tower, 3¾ miles eastward of Ponta Jea, and other objects should be seen.

Lights.—About 1¼ miles northeastward of Macuti Point is a concrete tower, 95 feet in height, with black and white bands, which exhibits at an elevation of 100 feet above high water a white revolving light, visible in clear weather from a distance of 16 miles.

A red fixed light is shown from a pyramidal tower, 65 feet in height, with red and white bands at the end of the old railway pier, 300 yards northward of Chivese Point, visible in clear weather 5 miles.

Fog signal.—During thick or foggy weather a fog horn is sounded at Macuti Point Lighthouse.

Signal station.—Vessels can communicate by the International Code with a signal station near the lighthouse, which is in telegraphic communication with the captain of the port's office.

Beacons.—About 800 yards eastward of Ponta Jea is an iron beacon 53 feet in height, surmounted by a St. Andrew's cross and a sphere, and another beacon, but 66 feet in height, is on Macuti Point.

Fairway lightbuoy.—The black and white horizontally striped fairway buoy, exhibiting a white fixed light, is moored about 11 miles 153° from Macuti Light Tower in a depth of 36 feet.

Channels.—The entrance to the river, obstructed by constantly changing banks, which partially dry at low water, spring tides, and extend a considerable distance from the shore, has three channels leading to it through these banks.

Portella (Southeast) Channel, on the southern side of these banks, is at present the only one used by vessels of deep draft; it is entered about 2 miles 321° from the fairway buoy.

Depths.—In 1914 the least depth on the bar of Portella Channel was 12 feet at low water, spring tides, and the banks in its vicinity are reported to be extending southeastward.

Buoys.—In addition to the fairway buoy, Portella Channel is marked by two buoys and a lightbuoy:

No. 1, a black spherical buoy, is situated 2$\frac{1}{10}$ miles northwestward of the fairway buoy.

No. 4, a red conical buoy, is at a similar distance, and in about the same direction from No. 1 Buoy.

Lightbuoy.—No. 2 is a red lightbuoy exhibiting a red fixed light, and moored nearly 1 mile northwestward of No. 1 Buoy.

Rambler Channel, branching off the northern side of Portella Channel, at about 2¾ miles westward of No. 4 Buoy, is about 5¾ miles in length in a northwest direction.

Depths.—The least depths in Rambler Channel are from 17 to 18 feet, on a bar crossing it towards its northern end.

Lightbuoys—Buoys.—The channel is marked by four lightbuoys and two other buoys:

No. 6 Buoy, red, on the eastern side of the entrance to Rambler Channel, exhibits a white fixed light.

No. 8, a red spherical buoy, showing a fixed green light, is moored nearly 1½ miles north-northwestward of No. 6 Buoy.

No. 10, a red buoy, exhibiting a fixed white light, is moored on the bar, crossing the channel, at 4 miles north-northwestward of No. 6 Buoy.

No. 12, a red buoy, exhibiting a fixed white light, is moored at the north end of the channel, 1¾ miles north-northwestward of No. 10 Buoy.

On the western side of the channel is No. 5, a black conical buoy, and off the town are Nos. 7, 9, and 11, the first black spherical, and last two black can. No. 7 Buoy shows a red fixed light.

Mandovy Channel, the third and northernmost entrance through the banks, has a number of shallow patches in it, which are of a changing nature; it is not buoyed, and is seldom, if ever, used.

Caution.—The positions of the buoys, as shown on the plan, are approximately correct, in relation to one another, but not in relation to the banks they are intended to mark, as these have changed considerably since the last survey.

Pilots.—The pilot boat is stationed about ½ mile seaward of the fairway buoy, at the entrance to Portella Channel, and in rough weather the pilot service is maintained by means of a twin-screw vessel of 100 tons, which, whenever possible, will sound the bar ahead of the vessel entering, and signal the depths ascertained. Pilotage is not compulsory, but vessels of more than 500 tons must pay the pilotage dues.

Tugs.—The services of a tug are always available.

Directions.—If the vessel's position is known a course may be shaped for the fairway buoy, otherwise it is advisable to make the sandhills, to the northeastward of the entrance, and steer southwestward, keeping from 5 to 6 miles offshore or in a depth not less than 7 fathoms.

A good lookout should be kept for the fairway buoy, usually seen from about 5 miles, approaching it between the bearings of 235° and 325°, which should lead clear of the banks extending from the river mouth on either side, and when near the buoy the land will gradually become visible, as also Macuti Point Light Tower.

The fairway buoy may be passed close to on either side, and from it steer to pass close eastward of No. 1 Buoy, and close southwestward of Nos. 2 and 4 Buoys, steering 284° from the latter buoy to pass southwestward of No. 6 Buoy, altering course to about 335° through Rambler Channel, being guided by the buoys, and leaving Nos. 8, 10, and 12 to the eastward, and Nos. 5 and 7 to the westward; after passing No. 12 Buoy, alter course gradually for the anchorage, guarding against the tidal stream.

A vessel arriving off the bar, with a draft of water approximating to the depth on the bar at the time, should remain outside No. 1 Buoy until high water.

Anchorages.—The limits of the anchoring space for vessels of war, on the south, is the line of the southern extreme of the highest part of the hospital, a red-roofed building on the sea wall, bearing 90°, and on the north a similar line of bearing of the intendencia flagstaff, the highest flagstaff in the town.

The anchorage for merchant vessels is to the northward of that for vessels of war, the southern limit of this anchoring space being the railway pierhead bearing 90°; above this, and close inshore, is the anchorage for hulks.

Vessels laden with explosives anchor to the southward of the anchorage for vessels of war, the northern limit of their anchoring space being the hospital bearing 48°, and the western limit the southeast point of Utanhe Island bearing 346°.

Tides.—It is high water, full and change, at Beira at 5h. 10m.; springs rise 20 feet, neaps rise 13 feet, neaps range 7 feet (approximate); the tides are irregular at neaps. The time of high water at the fairway buoy is about 40 m. earlier than at Beira.

Tidal streams.—The tidal streams run very strongly, especially with a high river in the wet season, the outgoing stream at the anchorage attaining a velocity of 5 knots at springs, and from 2 to 3 knots at neaps, these last rates being those of springs in the dry season, with a low river, at which time neaps run from 1½ to 2 knots. The in-going stream has a velocity of from 1 to 2 knots.

During springs the outgoing stream runs from seven to eight hours, and the contrary stream from four to five hours, with very little time of slack water, and in places the streams set obliquely across the channel, so that vessels frequently ground through neglecting to allow for this, but, the bottom being soft, they usually get off without damage.

Port.—Between Ponta Jea and Ponta Chiveve, the latter 1½ miles to the northward, the east shore is fronted by a drying bank extending 1,200 yards south-southwestward of Ponta Jea and 1,400 yards from the shore between the points; the shore bank, under 3 fathoms, extends ½ mile farther westward. Northward of Ponta Chiveve is the entrance to Chiveve Creek, which extends about 1½ miles southwestward, parallel to, and about ¼ mile within, the shore.

A sea wall surrounding Ponta Chiveve extends to the southward to the extreme of Ponta Jea, thus inclosing a considerable amount of reclaimed land, and Chiveve Creek has also a wall with a reclaimed area.

An iron railway pier, 400 feet in length, will accommodate vessels of 32 feet draft alongside it at low water, and at the customhouse is a concrete wharf, at which dredging is being carried out so as to allow lighters and small vessels to go alongside; it is equipped with five steam cranes lifting from 3 to 15 tons, and there is also one of the latter on the railway pier. The railway runs onto the railway pier and crosses Chiveve Creek on a steel three-span bridge, which opens to allow the passage of vessels.

Town.—The town of Beira, founded in 1891, and standing on Chiveve Spit, separating Chiveve Creek from the river, is protected by sea walls from the encroachment of the river; it is the principal port and capital of the Mozambique Co.'s territory, and, being the terminus of the railway to Salisbury, is of growing importance. It has an excellent British as well as a Portuguese club, several banks, good hotels, and sports club with grounds for football and cricket. The total population in 1913 was 8,710, of which 1,087 were whites and 268 were British subjects. A British consul is resident.

Communication.—The British India Co. have fortnightly services to London and Bombay, and the Union Castle Line have a monthly service to the former place, also to Mauritius; Messrs. Rennie & Co., Clan, Ellerman-Harrison, Bucknall, and Houston Lines have irregular services to London, Glasgow, and Liverpool, and the Empreza Nacional de Navegação have a service to Lisbon, via the Cape.

Mails are dispatched and received weekly from Europe, via rail to Cape Town, and twice weekly between Beira and Rhodesia and the southern districts of the territory.

Beira has railway communication with Salisbury, distant 375 miles, via Manica, and Salisbury is in direct railway communication with Cape Town, via Bulawayo, also from Salisbury branch lines run to Ayrshire and Mazoe, and a railway will connect Beira with Port Herald; telegraphic communication with all parts, a submarine cable connecting Beira with Mozambique and Lourenço Marques.

Coal and supplies.—About 500 tons of coal are stocked among two companies, who import about 2,000 tons annually for their own use, therefore vessels intending to coal here should give, if possible, 10 days' notice; coaling is carried on by baskets, and about 300 tons could be put on board in 24 hours, 42 lighters being available.

Fresh beef, vegetables, and bread are all plentiful, and can be obtained regularly, but mutton and other fresh meat is limited in quantity. Fish are abundant, and game can be obtained in season, as there is now a close time. Water is supplied to vessels by a water boat, and the river water can be obtained for boilers; the water supply is to be improved.

Hospitals.—A hospital with 47 beds is maintained in the town, also isolation hospitals, in the event of plague, are on Ponta Jea and on a hulk; disinfecting apparatus is in constant readiness for use in the cases of individuals, baggage, or cargo. A new hospital, in course of construction, is expected to be completed in 1916.

Time.—Uniform time of the meridian of 36° east, or 2 h. 24 m. fast of Greenwich mean time is kept.

Trade.—The principal exports, consisting of sugar, rubber, beeswax, ivory, hides, and groundnuts, in 1913, amounted in value to $2,701,102, the reexports amounting to $3,166,340, and imports to $2,787,303; in the same year the port was entered by 534 vessels of an aggregate tonnage of 1,488,296 tons, of these 236 vessels of 898,816 tons were British.

Climate.—From December to March is the wet, and from June to October the dry season, November to April being the hottest, and from June to August the coolest months; May, when the country dries up, is probably the most unhealthy season, but for four months after that the weather becomes almost pleasant and health improves.

The prevalence of mosquitoes has been greatly reduced by filling in part of Chiveve Creek, the reclamation of land, and the clearing of bush for the extension of the town.

Vessels in the river between June and August state that the climate was very pleasant, the maximum temperature being from 76° to 80° and minimum 59° or 60° F., the nights being cool, with heavy dews and thick mists hanging over the river from about 3 a. m., and not clearing away until between 8 and 10 a. m.

Winds.—East to southeast winds prevail all the year round, the force sometimes being from 4 to 6, but calms are also frequent.

Upper river.—Vessels of about 9 feet draft can ascend the river for 12 miles above Beira, beyond which place the navigable channel is winding, the banks and crossings continually changing, and it would be imprudent to attempt to ascend without local knowledge or the assistance of a pilot, although it is navigable for small vessels of 4 feet draft for about 100 miles during high and for about 50 miles during ordinary low river.

Sometimes with a very low river and at neap tides it is only navigable for canoes as far as Nhamacade Point, a few miles above the iron railway bridge, crossing the river at Fontesvilla, about 35 miles above Beira. The river trade with the Buzi River has considerably increased.

Tides—Height of river.—It is high water, full and change, at Mapanda, about 43 miles above Beira, at about 6 hours later than at the latter place, and during the height of the dry season, about the middle of July, the stream only runs up about one hour each tide, the rise being 18 inches at springs and 9 inches at neaps; no record is obtainable for the rainy season.

The rise of the river, closely resembling that of the Zambezi, begins in December or January, attaining its maximum height about March, when beginning to fall; it reaches its minimum about the end of August, remaining so until October or November.

Coast.—From Macuti Point the coast has a general northeast trend for 36 miles to Mavendeni River, which is small, and on this stretch the coast rises slightly, and is bounded by a range of low sand hills; at about mid-distance the sand hills are somewhat noticeable, as here there are a number of sharp-pointed hills about 200 feet high, resembling pyramids, and rendered more conspicuous through being without vegetation, as the surrounding country is thick jungle.

From Mavendeni River to the western entrance to the Zambezi the land is lower, and several unimportant streams discharge, the principal of these being the Nhamatarara and Mupa Rivers.

West Luabo (Luana) River, about 50 miles northeastward of Mavendeni River, is entered between Kirk and Ord Points, 1½ miles apart, and near the latter point trees commence, thickly covering the eastern bank of the river; the land is low to the southwestward, but the river may be known by a range of hummocks on its eastern side.

The river, which has been frequently mistaken for the Zambezi, but has no connection with it, except perhaps by small and entirely unknown creeks, has a winding course for about 20 miles, and at 25 miles from its mouth receives the Thornton River from the westward.

Bar—Depths.—The bar, extending more than 2 miles from the shore, had (1861) from 3 to 6 feet on it at low, and 16 to 17 feet at high, water, spring tides, but it is probably subject to considerable change; within the river has depths of 2 fathoms for about 20 miles, beyond which it does not appear to have been sounded.

Tides.—It is high water, full and change, at 4 h. 30 m.; springs rise from 2 to 15 feet. Both streams run regularly in the river at rates of from 1½ to 2 knots.

Zambezi River, rising in the Lunda country, on the borders of Angola, probably in a marshy lake named Dilolo, after a course of more than 1,200 miles, falls into the sea through a delta about 37 miles in width, having drained an estimated area of 600,000 square miles.

From its source it is first known as the Liba, below which it is joined by the Longo-e-bungo or Dungeungo and the Liambe or Yambaji, the three streams uniting and, added to by the Uyengo, forming the Upper Zambezi, under which name it flows eastward of south through Barotseland.

Below this it receives the Lunyantli or Chobe, and turning almost due east runs over the Victoria Falls, then turning northeastward it enters Portuguese East Africa at Zumbo, a small settlement at its confluence with the Loangwa or Aroangwa, which river forms the Anglo-Portuguese western boundary, and is its most important tributary, except the Shire, which river drains Lake Nyasa, and receives the Ruo River.

Delta.—The several mouths flowing through the extensive delta are the Milambe, the Inhamissengo or Kongoni, the River Zambezi (East Luabo or Koama), the Muselo, the Chinde with the Inhamacatiua entered from it, and the Inhamhona or Maria Mouth, all of which have bars changing in depth from time to time; the Chinde, although one of the narrowest and most tortuous, is the deepest and the one now used.

The large body of water, running out of the various mouths during the rainy season, combined with the continuous heavy ocean swell, so alters the position of the several bars, causing islands to form and to be washed away, that the entrances are never alike for two seasons.

The bars have probably their maximum depth from the end of February to the end of March, when the river is in flood, and their minimum depth from September to the commencement of November, and especially the latter period, which is the end of the dry season.

The bars, details of which will be separately given, should never be attempted without the assistance of a pilot or previously examining them.

Fluctuations.—The fluctuations in the depth of the river are very considerable, as, during the rainy season, the water rises in floods from 15 to 20 feet, sweeping down with great velocity and filling all the valley, but after the month of March it falls rapidly and at the height of the dry season the stream is reduced to channels of water, winding between dry sandbanks, with here and there shallows, not permitting the passage of a draft of 18 inches; there is, therefore, no permanence in either the direction or depth of the navigable passages.

Navigability.—There is only a depth of 1 foot at low river in the dry season at the junction of the Chinde with the main stream, and vessels of 10 feet draft can seldom pass over the bank. For navigability above, see Inland navigation.

Aspect.—The land separating the various entrances is low, the tops of the trees nowhere exceeding from 50 to 80 feet in height, and the similarity of the appearance of different mouths renders it somewhat difficult to distinguish any particular one; the Zambesi Mouth, 1½ miles in width, and the widest and straightest entrance, lying between two comparatively high and densely wooded points, is perhaps the most easily distinguished on account of its width, the other entrances being mostly narrow. The Chinde Mouth should be somewhat conspicuous on account of the buildings, etc.

Depths offshore.—A line of soundings, with depths from 13 to 15 fathoms, passes about 11 miles outside the mouths as far eastward as the Muselo entrance, and about 18 miles outside the Chinde Mouth; whence it decreases gradually to the depth of 5 fathoms at 5 miles off that river.

Tides.—It is high water, full and change, at the Zambezi Mouths at 4 h. 30 m.; springs rise from 12 to 13½ feet; neaps 8¾ feet. At Mchenga, 25 miles from the entrances it is high water, full and change, at 4 h. 50 m.; springs rise 5 feet. There is no rise of tide about 5 miles above Mchenga, but the downward stream is checked by that flowing in the opposite direction, as far as Expedition Island, above which the downward stream is constricted, varying from 1½ to 3½ knots according to season.

Milambe River, the entrance of the Zambezi, 6 miles eastward of the West Luabo, and 3½ miles westward of the Inhamissengo, which it joins about 5 miles above its mouth, appears to be choked with sand banks at its entrance; it has not been examined.

Inhamissengo (Kongoni) River, the entrance to which lies midway between the West Luabo and Zambezi Mouths was, with the exception of the Chinde, the best-known entrance to the Zambezi, but it is now seldom used. The river has a direction to the northward for about 4 miles from the bar and then follows a rather tortuous course with a general northeast direction and depths of from 2 to 5 fathoms for a farther distance of 8 miles to a position just above the village of Kongoni, where it bifurcates.

The Doto, the northwestern branch, is very shallow and but little used: it joins the main channel of the Zambezi opposite the junction of the Chinde.

In October, 1893, the British naval vessel *Mosquito* anchored about 5 miles up this branch, and Lake Sakassa and Zuere Village, a few miles from its western bank, were visited, using a path across swamps; the banks of the lake are high and well wooded, the water clear and good for drinking purposes, and fish were plentiful.

Madaranda, the eastern branch, only 10 yards wide in places, turns sharply round the northern end of Monguni Island, and is scarcely 3 miles in length to its junction with the Zambezi; it is said to have a depth of 2 fathoms at low water, but the channel is tortuous and there are many snags in it. In the same year the *Mosquito* passed through with some difficulty, owing chiefly to the overhanging foliage, and it was by this branch that the expedition under Dr. Livingstone entered the Zambezi.

Inhangurue Island occupies the space between the entrances to Inhamissengo and Zambezi Rivers, and within it is a boat channel of the same name as the island, communicating between the two rivers. The *Mosquito* passed through it in November, 1894, during the period of low river, in not less than 5 feet at low water; it is subject to change.

Bar—Depths.—Each side of the entrance to the Inhamissengo is fronted by sand banks and breakers to a distance of 1½ miles where the outer parts of the banks are connected by a narrow sand ridge with only from 2 to 5 feet at low water, springs, or from 14 to 17 feet at high water, springs, the greater depth usually being found during the height of the rainy season, about March. A steam vessel of 12 feet draft has crossed the bar, which at times is possibly available for vessels up to 15 feet draft. In 1893, it was reported that there were 19 feet at high water, springs.

Directions.—Vessels proceeding to the anchorage off the Inhamissengo unless certain of their position should make Zambezi River mouth first, as its entrance is more easily discernible from its much greater width. Having made it, steer westward along the coast, keeping in depths of 4 or 5 fathoms, until the Inhamissengo entrance is identified, when the anchorage described should be taken up.

If wishing to enter the river the bar should be examined before doing so; the surf breaks right across it at low water and the channel can not be distinguished, but within the channel deepens.

In crossing the bar a probable westerly set must be guarded against.

Outer anchorage.—The most convenient anchorage off the bar is with the gap in the land bearing 347° in a depth of about 4½ fathoms, over sand; but except in fine weather vessels should lie farther out. The current generally sets westward, causing vessels at anchor to lie broadside to the usual southeast wind and to roll considerably.

Tides.—It is high water, full and change, at 4h. 30m.; springs rise about 12 feet. At springs, the outgoing stream runs from 4 to 4½ knots in the entrance.

Settlement.—In 1893, of the settlement of Conceicao, 10 miles above Inhamissengo, only one house, that of the owner of the Prazo, was standing, but the gardens contained quantities of oranges and lemons. Guinea fowl and wart hog abound, and also small leopards.

River Zambezi (East Luabo, or Koama), 1½ miles wide in its entrance, between the points of Inhangurue and Timbue Islands, is the widest outlet of this river. First Bluff Point, on the western side of entrance, so named from its high straight trees standing very close together, and Hyde Parker Point on the eastern side, both sufficiently remarkable objects, coupled with the wide entrance between them, afford means for identification.

Bar.—The shallow water fronting the mouth of River Zambezi extends about 3½ miles seaward of the entrance, and at low water, the sea breaks completely across the passage, at which time a great portion of the banks are uncovered; it is said to be impracticable during the dry season, and is probably subject to alteration.

In the rainy season, at springs, the river banks are frequently overflowed, but not for more than three or four days at a time; the water is fresh down to the bar with the outgoing stream.

Inhangurue Island had a few straggling villages in 1894 and on Timbue Island there was a considerable population; coconuts and mangoes were plentiful.

Muselo River, about 10 miles eastward of River Zambezi entrance, has some sandy cliffs on its northeastern side, which may assist in identifying it; about 10 miles from its mouth it joins the Zambezi; the banks are thickly wooded, but there appears to be no villages near them. The bar, about 4 miles offshore, when examined some 40 years ago was stated to be impracticable even for boats in ordinary weather, there being a heavy surf on the only spot where a channel appeared practicable.

The channel within the bar was examined by the British naval vessel *Mosquito* in October, 1894, the dry season, and was found to have but 3 feet at low water in one place.

Chinde River, about 17 miles north-northeastward of Muselo River, and the best and now the only entrance to the Zambezi in general use, is about 20 miles in length between its entrance and its junction with the Zambezi. Foot (Liberal) Point, the southern point of entrance, is low, with some trees and scrub on it. Mitaone, the northern point of entrance, lies 1½ miles eastward of it, but the river is only 1,400 yards in width between Foot Point and the northern bank.

Light.—A white fixed light is shown from a semaphore tower, 37 feet in height, situated about ½ mile southward of Foot Point, and should be visible in clear weather from a distance of 10 miles.

Beacons—Lights.—Two black and white beacons stand on Mitaone Point, and in line lead over the bar; by night each beacon shows a white fixed light.

About 1½ miles within Mitaone Point are two white beacons which in line lead in the channel along the north bank; by night each beacon shows a red fixed light.

Bar—Depths.—The points of entrance are fronted by sand banks, drying from 8 to 10 feet on their inner parts, and over which at times the sea breaks heavily to a distance of 2 miles, and between their extremes is the bar, which usually has over it about 6 feet at low water, springs, but in December, 1911, had 21 feet at high water; the depth and direction of the best track over the bar are constantly shifting, and not to be depended on; therefore a pilot should be employed or the bar examined before entering.

Within the bar the depths increase to from 10 to 30 feet, and abreast of Foot Point and westward past the settlement, the river is 1,400 yards in width, gradually narrowing to about 800 yards abreast of the western end of Mitaone Island, 2¾ miles within Foot Point.

From this to about 1 mile above Sombo, or 13 miles from the entrance, the river, 200 yards in width, has sufficient depth for any vessels that can cross the bar, but above this it becomes much narrower, and the depths are reduced to from 6 to 8 feet in places; at its junction with the Zambezi there is a bank across the river with only 1 foot in the dry season at low water.

Buoys.—The fairway buoy, moored in a depth of about 7½ fathoms, 4 miles southeastward of Mitaone Point, is a black can buoy, surmounted by a small white cylinder.

In 1911 the entrance channel was marked by a red conical buoy, surmounted by a triangle, on the starboard, and by a black buoy on the port, hand entering.

Caution.—Neither beacons nor buoys are to be depended on.

Pilotage, etc.—The native pilots for the river are both numerous and skillful; the charge for either entering or leaving the river is 50 milreis. Two steam tugs are available if required.

Directions.—The land in the neighborhood of Chinde River entrance is low, and similar to that at the other entrances to the Zambezi, but the somewhat conspicuous sand hills, 57 feet high, on the northern side of Inhamhona River, 2½ miles northeastward of the Chinde, will be identified on a nearer approach.

Having identified the entrance, a vessel should steer for the outer anchorage to wait for a pilot, and if one can not be obtained the bar must be sounded before entering; the best time for crossing the bar being from 1½ hours before to high water.

Anchorage.—The outer anchorage is in a depth of 4 fathoms from 3 to 4 miles southeastward of Mitaone Point, outside the fairway buoy. In the river there is good anchorage in the fairway between Foot Point and Luabo Point Spit, 2 miles above, in from 2½ to 4 fathoms, good holding ground, but vessels should moor. Strong easterly winds render the anchorage off the concession untenable for small craft, but at such times they can shift higher up.

Tides.—It is high water, full and change, in the Chinde entrance at 4 h. 30 m.; springs rise 12 feet, neaps 8¾ feet, neaps range approximately 5½ feet. These observations were made in July, but in September neap tides were found to be very irregular, with a range of from 1½ to 3 feet.

Tidal streams.—The Chinde River is tidal throughout, the ingoing and outgoing streams turning about one hour after high and low water at the bar, and running from 2½ to 3½ knots, respectively, at springs, but occasionally during neaps there is no perceptible ingoing stream.

Chinde to Zambezi River.—The banks of the Chinde River between Chinde and the Zambezi are fringed by dense forests of mangroves, obscuring any glimpse of the grassy plains beyond, but the mangroves cease when nearing the Zambezi, and the banks, increasing in height, change from black clinging viscous mud to a sandy or in some places clayey character.

There is depth enough at all states of the tide for a vessel within Chinde Bar to reach 1 mile beyond Sombo; but, if proceeding into the Zambezi, the arrival at Sombo should be timed to reach it about an hour or more before high water, as the river beyond has from 6 to 8 feet only, in places, at low water, and is very narrow. The village of Sombo is about 12 miles above Foot Point, and the old village of Chinde is 8 miles farther, on the southern side, at the junction of the Chinde with the Zambezi, where the river is from 800 to 900 yards in width.

A vessel of about 150 feet in length having reached the upper part of the Chinde must continue on into the Zambezi, as there is no room to turn. The bar abreast of the junction with the Zambezi has only a depth of 1 foot at low water in the dry season, when it is seldom that a vessel of 10 feet draft can pass.

From the bar the turn northward into the Zambezi was sharp round a spit extending from the northern point, the channel between it and the bank in mid-channel of the Zambezi being only about 30 yards wide, and the deep water at this part being along the eastern bank. In September, 1890, the British naval vessel *Redbreast* anchored just above the junction in 4 fathoms, but had to shorten in cable when swinging to the tidal stream.

Inhamacatiua River enters the Chinde between Maria and Fremantle Points, and about 5 miles up it is joined by the Inhaombe from the northwestward; two islets and some drying banks lie within Inhamacatiua River entrance. In October, 1893, the low river period, the British naval vessel *Mosquito* entered the Inhamacatiua from the Chinde with a rising tide, and, without difficulty, reached the Zambezi at Juau, about 6 miles above the Chinde Junction, thus avoiding Sombo.

This route is said to be 1½ hours shorter than by the Chinde, but the depth was as little as 3½ and 4 feet in places, and as at about 2 miles from its entrance the river is crossed by a telegraph wire, 14 feet above low water, springs, it would appear that only boats can navigate it.

The Inhaombe was also ascended for some miles, to just above the village of Samakota, where the stream nearly dries at low water, springs, and the trees overhang the curves, which are very sharp; about 12 miles above this the river ends in a swamp.

The stream entered about 1 mile southwestward of Fremantle Point was also examined, and up to its junction with the Inhamacatiua was found to be deep and sufficiently wide in all places for the *Mosquito;* by this stream the flats in the mouth of the Inhamacatiua are avoided.

Settlement.—The Portuguese settlement of Chinde, situated on a sandy plain on the north side of the eastern extreme of Timbue Island, is governed by an intendente who represents the administration of the Province; it consists chiefly of corrugated iron roofed houses, but there are some good buildings of both wood and iron, which include lookout house, two hotels, customhouse, and barracks; a detachment of native soldiers under a commandant are stationed here.

Westward and adjoining the Portuguese settlement is the British concession, with buildings, etc., which has a river frontage of about 1,200 yards and extending back from it about 800 yards, but considerable erosion of the bank goes on continually; the seaward portion is allotted to British trading companies. There is a patent slip, and there are workshops for the repair of river steamers.

In 1913 the European population numbered 247, of which number 57 were British subjects, while the native and other population was estimated at 2,115.

Groynes have been built to protect the foreshore, but there is great difficulty in carrying out any effective works, in consequence of the continual erosion of the river shore, also on account of the occasional heavy floods.

Communication.—The Union Castle Line have steamers every month, and the Empreza Nacional de Navegação have irregular callings; at least one river steamer leaves Chinde for the interior every week.

Chinde is connected by telegraph with Kiliman via Sombo, and with Salisbury, Cape Town, and Blantyre via Tete.

Supplies of provisions are fairly abundant.

Water.—The river water both in the Zambezi and Shire is perfectly good; the water, when the rivers are in flood, is turbid, and if left to stand throws down a certain amount of deposit, but it is always good when filtered. Water from wells should be avoided, but if used should be boiled.

Trade.—Chinde is a transshipment port for goods to British Central Africa, and in 1913 the exports, consisting of salt, sugar, wax, raw cotton, live stock, rubber, ivory, and bark, were valued at $1,188,175, the imports, of textiles, liquors, foodstuffs, iron and steel, ironmongery, agricultural machinery, tobacco, soap, cement, and tea, amounting to $2,046,323.

In the same year the port was entered by 193 steam and 77 sailing vessels, with aggregate tonnages of 75,555 and 36,392 tons, respectively. The transit trade on the Zambezi and Shire Rivers employs 25 vessels and 140 barges.

Repairs.—Small repairs to river steamers can be undertaken by two firms.

Climate.—Chinde is comparatively healthy, and, mainly owing to the sea breezes, a short stay frequently benefits those, from the interior, who are suffering from malarial fever.

Inland navigation—General remarks.—The Zambezi is only navigable by steamers of very light draft, at all times of the year, and at low river, anything over 18 inches draft, may ground in places. It is navigable by vessels up to 5 feet draft during high river, or about February and March, but the navigation is blocked by Kebrabasa Rapids some 150 miles above Tete, or about 320 miles from the sea; above these rapids the river is again navigable beyond Zumbo, which is on the western frontier of Portuguese territory.

The river is navigable to Massanangue at the foot of the Kebrabasa Rapids for steamers of the draft above mentioned, during eight months of the year, but for the other four months the shallows, where the river broadens to about 3 miles near Sena, make the navigation difficult.

Pilots.—As already mentioned, the river pilots are numerous and skillful.

Anchorage.—Vessels or boats seeking temporary anchorage are recommended to anchor usually well out in midstream in preference to near the banks; but in early May a good lookout must be kept for the large masses of grass, resembling floating islands, which are brought down by the stream, especially in the lower part of the Shire, as not only are they liable to trip the anchor, should one foul the cable, but there are often snakes among the grass. At this time anchorage should be sought well under the lee of a bend, and the anchors should be sighted about every 10 days when the river is in flood, otherwise they may get buried.

Tracking boats along the river banks is possible for short distances in most places above the delta during low river.

Natives.—The natives near the banks of the Zambezi are usually friendly and ready to trade, but opposite Tete the country away from the banks is, or was, in an insecure state.

Supplies.—Fowls and game are fairly plentiful, goats may occasionally be obtained, but fruit and vegetables are scarce; the stations of the African Lakes Corporation afford the best supplies. On the

Shire, goats and fowls are very scarce, but may sometimes be procured. The river water, after being filtered, is always good for drinking; but it should be first boiled.

Firewood is supplied by the Luabo, Madal, Zambezia, and Mozambique companies.

On the Shire, wood can be supplied at Masanji, just below Port Herald, and at Chiromo. Above that, wood is cut and sent off as required, when the river is navigable.

The African Lakes Corporation have trading stations at the Concession in the Chinde, and at Chiromo and Katunga on the Shire, whence there is a road via Blantyre to Matope and Mpimbi on the Upper Shire.

General directions.—Owing to the constant and rapid changes which occur in the navigable channel of the Zambezi, no permanent directions of any value can be given; islands form and wash away, and channels well known in one month may be found to have disappeared a month later; the navigable channel bears no proportion in the dry season to the width of the river, which varies, below Sena, from ½ mile to over 3 miles, and is in places studded with islands.

The channel crosses and recrosses from bank to bank, rendering the distances traversed in many places quite double that shown by the chart. In these crossings the channel is always shallower than where it takes the direction of the banks, but the worst portions are usually pretty clearly defined.

In calm weather there is a peculiar boiling up of its water, and when the wind is blowing up the river, as it usually does, the ripples on the shallows are more marked than in the deeper water, and similar ripples or breakers mark the edge of the shallow bank above. These ripples are almost the sole guide of the pilot.

As a general rule, by keeping on the outer side of the bends of the river, and away from the points, most of the shallow places will be avoided, as in all river navigation. At a crossing, keep well up toward the upper sand bank, more especially when descending the river, as if grounding on it the vessel will be washed off by the current, but grounding on the lower bank means hours lost in laying out anchors and heaving off, and in the latter case the vessel's head must be pointed upstream as soon as possible.

Commander H. J. Keane, late of the *Herald*, remarks: "The constant change is not confined to the river bed; the banks are continually being fretted away by the combined action of the wind and water, so that huge masses of earth are constantly falling into the stream, to be carried away and deposited in some position that will astonish the navigator, who, steaming with a certain amount of confidence down a channel that he has found to be fairly permanent, suddenly discovers the vessel to be aground. On a fine calm day the experienced eye may detect it before too late, but such knowledge is only to be obtained by hard experience of a trying description."

Snags are plentiful in the Chinde, Zambezi, and Shire, and are a constant source of anxiety, as each year's flood brings down fresh ones, and, to add to the difficulty, if they are 2 feet below the surface there is no sign of them. They are more numerous in the Shire above than below Chiromo.

High river.—The first rise in the Zambezi, after low river, beginning with the lesser rains in November, attains its maximum about the end of December or the beginning of January, a maximum of 13½ feet being registered at Tete. The river then falls a few feet, until succeeded by the great rise, which takes place after the river has inundated the interior, and is at its highest at Tete in March, amounting usually to about 20 feet above low water.

The rise is sudden, and the water, at other times almost chemically pure, is highly discolored and impure, but still good for drinking purposes, while the current runs down at from 4 to 5 knots, but in a very few days after the first rush it resumes its usual rate at Tete of about 2 knots, although lower down the maximum is 3½ knots. In April the river is falling. The rise in the Shire generally occurs about the same time as in the Zambezi, but it differs at times, depending on the rains in the districts from which the rivers flow.

Low river.—The banks of the Zambezi being mainly composed of light, porous, sandy soil, offering little resistance to erosion, the banks in some parts are constantly falling away, thus widening the river and reducing its depth, and the general character of the waterway during the dry season after June is comparatively deep reaches separated by shallow bars, the position and depth of which vary from season to season, depending on the lowness of the river and the effect of the previous flood. Thus, while at some seasons a vessel of 3 feet may possibly pass, in another 18 inches is none too little.

More or less permanent shallow places are found in the Zambezi, even nearly down to its junction with the Chinde, where there may not be more than 2½ feet, but more particularly between its junction with the Shire and Tete. From the month of August to early November, for about 15 miles above the junction, and again in a portion between Sena and Lupata Gorge, the river is hardly navigable for anything drawing over 1 foot.

The flats in the Zambezi above the junction of the Shire are avoided by passing round Inhamgoma Island, ascending the Shire to the northern end of the island, and descending by the Ziu-Ziu, the western channel, reentering the Zambezi by it.

In the dry season the stream in the Zambezi runs from 1½ to 2 knots, and in the lower Shire from ¾ to 1½ knots.

Winds.—In the daytime the wind blows from the southward, up river, nearly all the year round.

Climate and rainfall.—The valley of the Zambezi is reached by the lesser rains late in October, when the sun is passing southward; these diminish or cease altogether in December, when at times there is a partial drought. The heavy rains usually begin when the sun, returning northward, is in the zenith, about the middle of January, and continue to the end of March or the beginning of April. There are light rains in the months of May and June, but the remainder of the year is dry.

The rainfall near Tete is from 33 to 36 inches, though as little as 19 inches was registered in one year; the rainfall over Lake Nyasa is said to be from 50 to 60 inches.

April and May are probably the most unhealthy months in the Zambezi and Shire, when, the rain having ceased, the action of the sun on the decaying vegetation is most active. February and March, the height of the rains, and November, the period of the greatest heat, are also unhealthy. The delta of the Zambezi and the lower valley of the Shire, particularly in the neghborhood of the Morambala and Elephant Marshes, bear the worst character, and the mosquitoes are a terrible plague. The upper valley of the Shire, above the falls, and Lake Nyasa are less unrealthy, but the climate is always trying to Europeans.

The report from the British naval vessel *Herald*, 1891, on the health of the several places is a follows: "Katunga, a very unhealthy locality. Chiromo, very fair. Vicenti, severe attacks of malarial fever at all seasons. Chinde River, no marked unhealthiness, but chills are dangerous; it was healthy and free from fever in September and October, the maximum temperature at that time being 75°, and the minimum 68°."

Sir John Kirk remarks: "The best rule for health for men employed afloat in the Zambesi is to go to bed early, avoid chills at night, have a cup of hot tea, coffee, or cocoa in the morning before exposing themselves on deck in the cold morning mists, which chill you to the bone, and on no account permit spirits to be drunk in the middle of the day. Sunset is the time for the men's allowance. Remember that mosquitoes are in millions on the Shire; I would always anchor in the stream clear of the shore."

Temperature.—At Tete, on the Zambezi, the greatest heat is in February, 103° being registered in the shade; it is coldest in July, about 72°, and in November it is about 84°. Between Tete and the coast, in February, the temperature is about 98° at noon, and 80° at night. On the Shire, below the Murchison Falls, in September, it is at times about 100° in the shade, but November is usually the hottest month.

Upper River.—The banks of the various mouths of the Zambezi for the first 10 or 15 miles are generally low and thickly covered with trees, the greater portion being mangrove jungle.

At about the junction of the Inhamissengo with the main stream, the pandanus or screw palm trees begin, many so tall as to resemble steeples. The soil is wonderfully fertile, well adapted to the growth of sugar cane; rice and many kinds of vegetable are grown; guava and lime trees are also abundant.

Numerous huts peep out between the bananas and cocoa palms on the west bank, standing on piles a few feet above the ground, as considerable portions of the land in the rainy season, toward spring tides, are overflowed for three or four days at a time.

Nearly all the eastern and northern banks of the river, from the delta to Lupata Gorge, is a concession to the Zambezi Co., while the Mozambique Co. have about 50,000 acres on the western and southwestern banks.

Old Chinde and Mchenga villages.—On the eastern bank, at the junction of the Chinde with the Zambezi, are the villages of Old Chinde and Maruga, 1 mile apart, and 5 miles above the latter is Mchenga village.

Above the junction of the Chinde with the Zambezi, the western bank abounds in coconut palms, and is somewhat higher than the eastern one, which is sandy; the banks of the river continue mostly of sand, with but few trees, until within 20 miles of Maruro, and it is possible to track boats in most places.

Marromeo, on the east bank, and usually the first stopping place for the river steamers, is an important French sugar plantation and manufactory, with a tall black chimney; here the river narrows somewhat with an increased current. About 1 mile above Marromeo is the Mozambique Co.'s customs station.

Mazaro, about 4 miles above Maruro, is situated at the mouth of a creek, which, during high river, about February or March, admits of the passage of boats from the Zambezi to the Kwa Kwa, a branch of the Kiliman River; during the dry season the bottom of this creek or canal, about 30 yards wide, is about 16 or 17 feet above the level of the Zambezi. The Barabanda, about 5 miles below the mouth of the Shire, also connects the Kwa Kwa with the Zambezi during the same period.

Abreast of Mazaro, the Zambezi is about ½ mile wide and the view is magnificent; the river is studded with islands, their sides clothed with grass and shrubs, with many a creeper and convolvulus. On the opposite bank is the Shupanga country, well wooded, and the home of the monster baobabs, many of enormous thickness. Vicenti is about 4 miles above Mazaro.

Mopeia and Marendene.—Mopeia, nearly 3 miles from the left bank of the Zambezi, but said to be nearer owing to the erosion of the river bank, is on the Kwa Kwa, about 80 miles above Kiliman town, and 80 feet above the sea level.

Communication.—Mopeia has telegraphic communication with a number of stations along the east bank of the river as far as Benga, opposite Tete, also with Kiliman and thus with Chinde, and with Blantyre.

In the dry season, there is just enough water at Mopeia for the smallest canoes; at this time that portion of the Kiliman trade following this route in lighters and canoes has to be unloaded at Marendene, few miles below Mopeia, where there is deeper water in the river, and then conveyed overland to the banks of the Zambezi.

Chupangah, about 15 miles above Mazaro, on the opposite bank, is an old-established and beautifully situated Franciscan missionary station, having low stone whitewashed buildings, very extensive and commodious, containing a chapel, school, and workshops, with a large vegetable garden; the river here, still about 800 yards in width, is deeper, and no sand banks are visible.

Above Chupangah the high river banks have increased luxuriance of tropical vegetation, and palms of various kinds become numerous, with immense baobabs and clumps of stiff euphorbias, while climbing plants cover bushes and lower trees in places. From this the outline of the Morambala Mountain, rising about 4,000 feet, shows glittering granite peaks, and rocky escarpments, with tree-covered foothills.

Between Chupangah and Chimoara on the east side of the entrance to the Shire River, the Zambezi is somewhat wider, and studded with islands, dividing it into shallow channels; the western bank, for 2 miles above Chupangah, is rocky and steep, with a few rocks a short distance from it, but above that the banks resume the same height as below.

Communication.—A railway is projected between Chimoara and Kiliman, and from it land wires run to Blantyre, along the east bank of the Shire, and crossing Inhamgoma Island and along the east bank of the Zambezi to Benga; it is also connected by telegraph with Mopeia.

Flat.—From about 3 miles below Chimoara the channels in the river become more intricate, and from the entrance to the Shire, for a distance of about 20 miles above, the river widens, and is studded with islands, dividing it into shallow channels, while in the dry season a flat across the river is so shallow as only to admit the passage of light boats, at which time the route round Inhamgoma Island should be taken.

Caia (Kaia).—At Caia, on the southwest side of Inhamgoma Island, there is a large plantation and a sugar factory.

Muterara, a station of the Zambezi Co., situated on the western side of the entrance to Zui Zui River, abreast of the west point of Inhamgoma Island, has a whitewashed stone house, built on an eminence about 100 feet above the river, with its eastern end descending precipitously to it; the surrounding land is poor and stony, and is experimentally planted with Sisal fiber, while farther up the oil palm is tried.

Sena, a short distance above Muterara, on the opposite bank, and formerly a principal Portuguese station, dating back to 1531, stands on a low plain with some detached hills in the background; it has a dilapidated fort, has lost its importance, and can not be approached from the river except when it is high.

Communication.—The telegraph crosses the river to Sena from Muterara, and then recrosses it above Sena.

Nyassereri, about 6 miles above Sena, and connected to it by a good road, except after heavy rain, when about 1½ miles of it is swamp, is the best place to land if wishing to communicate with Sena. Inyakarenga is about 5 miles above Nyassereri.

Between Sena and Sinjal, a distance of about 40 miles and situated on the opposite bank, the western bank of the river is beautifully wooded, undulating country, while on the opposite bank the Massowa hills rise gradually from the river to an unbroken tree-covered ridge about 1,000 feet high, continuing for 10 or 15 miles after leaving Muterara, and then increasing to the dome-shaped peak of Massowa, about 3,000 feet, from which it gradually lowers.

Inland the western bank is a flat country, consisting of wide stretches of open grassland, alternating with thick bush and forest, the borassus palm growing to an increased height to those on the banks below. The river about this part is fully 3 miles in width and shallow, while crocodiles become very numerous, resting on every exposed sand bank. The river here is only about 70 feet above sea level.

Between Inyakarenga and Maria Pia, near the commencement of Lupata Gorge, the navigation is said to be difficult, the river being thickly studded with islands, and a good lookout is necessary for snags. Singal, on the east bank, is a small wooding station with a couple of huts and piles of telegraph poles; it has telegraphic communication both up and down this bank to the various stations.

Wood may be obtained in small quantities by arrangement with the natives, but it should be remembered that there are concessions to companies on both sides of the river, so that it would be advisable to ask permission from the managers at the various places.

Above Inyakarenga there are stockaded tax-collecting stations at Shimbwa, Shimiara, Nkuesa, and Maria Pia, and these, locally known as aringas, are said to be safe stopping places for boats should the country be in a disturbed state, which is now probably unlikely.

Tambara Fort, a whitewashed stone structure, occupying a commanding position on the extremity of a high ridge overlooking the river, and built as a defense against the natives, is near the commencement of Lupata Gorge, the banks of the river in its vicinity being thickly populated, with gardens of maize, millet, etc., extending in places to the water's edge.

Communication.—Between Singal and Lupata Gorge are telegraph stations at Anevaze, Sangara, and Bandar.

Lupata Gorge.—The river having narrowed considerably enters Lupata Gorge, a natural cutting of great beauty through a system of high, undulating, sparsely wooded hills, which descend sheer into the water, with many rocky bowlders of great size at their feet; about 1 mile within the entrance is Panzu'ngoma, a high, isolated, conical peak, and farther, on the opposite side, is Mwana-katsitsi (the hairy child), the densely wooded highest peak of a long ridge of hills.

The steep stony banks here rise abruptly from the water's edge, with much thinner vegetation, but an increase in the number of baobab trees, and at several points, where the foothills recede a few hundred yards from the river, native villages are seen over their surrounding stockades; where the long ridge of Mwana-katsitsi comes down in a bowlder bluff to the water's edge the gorge sweeps round to the southwestward.

The mountains, showing deep indentations, often after descending gently for a few hundred feet, suddenly fall sheer for several hundreds more, as through the effect of a gigantic landslide, and deep ravines on their faces are doubtless due to a similar cause. In the middle of the second curve the shore on the south side forms a vast semicircular amphitheater, with rocky peaks rising from the bottom and sides, showing the glittering granite through the foliage.

On the opposite bank are also a number of peaks, extending back about 3 miles, and surrounded at their bases by tropical vegetation, with grass and reeds fronting them; here the water is much clearer and freer from organic matter than lower down the river.

The western extreme of the gorge, 17 miles from its eastern entrance, has huge cliffs of porphyritic formation, descending sheer to the water, which is of great depth, and in mid-channel is Mozambique Island, small, and formed of granite; the cliffs are the nesting places of marabou storks, eagles, and other raptorial birds.

Current.—The current experienced by gun vessels passing through in the month of February exceeded 4½ knots in places, and they were scarcely able to make headway against it at full speed, but at that time the river had been in flood, and risen 4 feet during the previous night.

Dr. Livingstone remarks: "A strong current sweeps round the little rocky promontories of Chifura and Kangomba, forming whirlpools and eddies dangerous for the clumsy native craft, which are tracked past with long ropes; heavy-laden canoes take two days to track through the gorge. The current above the gorge is stronger than that below, probably running about 2 knots at this season, that below being assumed to be about 1½ knots. In the gorge the current ran about 3 knots and the launch steamed through with ease."

Sungo.—Immediately above the Lupata Gorge, on the eastern bank is the Aringa of Sungo, having a small fort with a detachment of Goanese soldiers; a small stock of coal is kept here for the use of the Portuguese gunboats. From Sungo to Tete the passage is easy and the channel deep, in some places 30 feet for 2 or 3 miles together.

Masangano has a fort constructed of stone, and about 200 feet length, on its river face.

Luenya or Shirena River.—An attempt was made in the British naval vessel *Mosquito* to proceed up this river, but about 2 miles above its confluence with the Zambezi it was blocked by large sand banks, with insufficient water for the gunboat to pass, though every portion was examined, but the natives stated that a few miles farther on the river narrowed and became deep, and from the point where the *Mosquito* grounded the narrows could be seen.

Muarese River.—On the eastern bank, and about 5 miles below Tete, is the Muarese or Mirarazi Stream. Coal has been found in the valley through which it discharges into the Zambezi.

Tete.—From 45 to 50 miles above the western end of Lupata Gorge, the river is about ½ mile in width, with arid and stony banks and an absence of the tropical vegetation met with lower down, and even the coarse grass is poor and thin. Amongst trees leafless baobabs predominate.

The town of Tete, standing on a succession of sandstone ridges on the western bank and dominated by Mount Carrueira, which is table topped, covers a large area, and, although there are some good houses, they are so scattered that native huts have sprung up between them, while the older buildings, generally of solid stone, with tiled roofs and wide verandas, are fast falling into disrepair.

The streets are rough, stony, and destitute of sidewalks, and the principal European houses stand on three almost equidistant ridges, running parallel to the river, the hollows between them forming the main roads. Two fortresses, the land fort at the back of the town and the river fort commanding the river, are both strong and substantial, and just below a white and blue washed church standing on a slight eminence is a well-built stone mole.

The date of the town being founded is uncertain and is even dated back to 1531, but it was formerly a place of considerable importance and was the headquarters of the Jesuits in this part, its downfall commencing with their expulsion. It is now regaining something of its former position as regards trade.

Communication is maintained on the river by steamers, and from Tete telegraph lines branch to Kiliman and Chinde to Salisbury and Cape Town, and northward to Nimule on the Nile, via Blantyre.

Wood and water.—Wood is procurable, but expensive, and the water for the town, coming from a well on an island, is neither clear nor good, while that of the river is very turbid during January and February and full of suspended matter, which filtration does not entirely remove. Mangoes are plentiful between November and March.

Revuke (Revugo) River, on the opposite side of the Zambezi River to Tete, was explored for 4 miles, as far as Inyamakaze or Diorite Rapids, where a reef of rocks and a cataract stopped further progress; it is very narrow, with a strong current, and the bottom being stony is dangerous to ground on.

Coal, giving most unsatisfactory results when tried, is found at a large mine close to Inyamakaze, the river being navigable to it, but the mine is not worked. There are several villages on the east bank.

Communication.—Benga, at the mouth of the river, has telegraphic communication, both direct along the east bank of the Zambezi, and by another line to Zombo, via Blantyre. This is the terminus of the land wire along the east bank of the Zambezi.

Broma.—Above Tete the country becomes more hilly, and the river narrows and deepens, in some places to 60 feet, but just below and above Broma, about 20 miles above Tete, are rocks in mid-channel, which may be avoided by ordinary care. At Broma is the mission of San Jose, with a very large stone house and a small church at the foot of a hill.

Sanguru, generally known as Panzo, has a fairly large aringa, and stands on the eastern bank of the Zambezi, and on the southern entrance to Mavusi River, which entrance is about 45 yards in width, with depths of from 7 to 10 feet in the month of February.

Freshets—Caution.—The British naval vessels *Herald* and *Mosquito*, when lying within the entrance to this river, its condition and the state of the weather being normal, experienced, without any previous warning except that rain had commenced about an hour before, a freshet with at least a 6-knot current, and a rise in the river of 6 feet, the water bringing with it large trunks of trees and masses of reeds.

One vessel parted cable and was swept into the Zambezi, and the other grounded, being high and dry when the river fell, and was only floated by a second freshet occurring a few hours later, which was stated by the natives to be a rare occurrence.

Karuge River, about 15 miles above Mavus River, but on the west bank, was explored for about 1 mile, when the water, shoaling to 2 feet, farther progress was stopped. Matakenya village is on this river, but between Sangura and its villages are few, and above it to Kebrabasa Rapids are only a few scattered huts.

Kebrabasa (Caroabassa) Rapids.—The country between Tete and Panda Mokua, a hill 2 miles below Kebrabasa Rapids, 86 miles above Tete, where navigation ends at a place named Massanangue, is well wooded and hilly on both sides of the river.

The lower rapid, seen at low river, had a fall of about 20 feet in a distance of 30 yards, the water rushing through a gorge from 40 to 60 yards wide, but at high river these rapids are said to disappear, and the width of the river to be ½ mile, and the rapids extending in succession nearly to Chiceva, a distance of 40 miles, are also said to be smoothed over at the same state of the river.

The river, after being practically rendered impassable for a distance of 40 miles by Kebrabasa Rapids, again becomes navigable at Chiceva, and continues so to beyond Zumbo, with only one rapid or two rapids that are not of a nature to stop navigation, until within 30 or 40 miles of Victoria Falls, and this upper reach is even more navigable than the portion between Sena and Tete, as vessels of from 2 to 2½ feet draft can use it; two rapids require to be known, but otherwise the river is safe.

In 1894, Lieut. Carr remarked as follows:

> At Kebrabasa Rapids the river suddenly narrows and runs between high rock walls about 60 yards apart. The current at this time of year (February) being exceedingly strong—so much so that the *Mosquito* going full speed could barely make headway—the water literally boils over, bursting into large bubbles over 1 foot high, and making it very difficult to distinguish between the rock and the deep water.
>
> Above the first reach the river narrows again and bends sharply to the southwestward, with rocks scattered about in every direction. Perhaps a very strongly built craft with powerful engines might advance above this point, but the chance of her coming down in safety would be very remote. The bottom and sides are rocky, and the least error or accident with helm or engine would mean disaster, especially to a vessel whose bottom is of very thin steel only.
>
> If the thing be possible, the best time to attempt it would be in May, when the river has commenced to fall; the diminished current would give a vessel a chance to steer and steam, but a sudden fall in the river, a matter of frequent occurrence, would condemn her to remain above the rapids for a year.

Victoria Falls are separated by an island into two portions, the whole measuring about 1 mile in width, and thus divided the river drops into a deep chasm from a height of 350 feet, causing a vapor to ascend which has caused it to be named by the natives the Mosi-ao-tanya, or smoke sounding. The streams rush toward one another in the chasm, producing a fearful boiling whirlpool, and then dash through a zigzag gorge, apparently not more than 20 or 30 yards wide, situated at right angles to the fissure of the falls, beyond which it expands into the upper reach of the Zambezi, but is not navigable for some 30 or 40 miles below, as before mentioned. The railway bridge crosses the river ½ mile below the falls.

The distances from the sea to various points on the Zambezi are, approximately, as follows:

	Miles.
Mazaro	75
Shupanga	84
The junction of the Shire	110
Sena	140
Lupata Gorge	235
Tete	280
Kebrabasa Rapids	325
Zamba, mouth of the Loangwa	500
Victoria Falls	950

It is probable that in the actual navigation of the river the distances here given are very considerably exceeded, and that, for instance, to reach the foot of the Kebrabasa Rapids a vessel will certainly have to pass over 400 miles of ground.

Shire River, draining Lake Nyasa, and flowing through Nyasaland Protectorate, receiving in its course the Ruo River, enters the Zambesi River, at about 110 miles above its mouth, by two channels, passing on either side of Inhamgoma Island, which divides the mouth of the Shire River; Ziu Ziu, the western of these channels, is shallow.

Of late years, for some reason unknown, the annual rainfall over Lake Nyasa, from 50 to 60 inches, which had considerable influence on the height of the Shire River, appears to have lost this to a great extent, although there is no diminution in the rainfall, with the result that it has been sometimes with the utmost difficulty that communication was kept open with Chiromo, the port of entry of the Nyasaland Protectorate.

Height.—It is stated that the greatest rise of Lake Nyasa seldom adds more than 2 feet to the dry season height of the river, so that only small steam vessels of the lightest draft can navigate it, and these do not now proceed above Port Herald, which is below Chiromo.

Entrance.—The mouth of the Shire River is rocky and somewhat dangerous, but, for about nine months of the year, the main or eastern channel can be avoided by using a channel about 30 yards wide, almost free from danger, between an islet in the mouth and the western bank. During very low river the main channel must be used, avoiding its eastern side and giving also the eastern point, on which are the whaleback trees, a good berth before turning up for the entrance.

Morumbala Mountain, meaning the lofty watchtower, is about 4,000 feet in height, 7 miles in length, and near the eastern bank of the Shire River, about 20 miles within its mouth; it is visible down the Zambezi at Mazaro, and is a striking object. The summit of Morumbala, though nearly always enveloped in mist, is far more healthy than the lower Shire Valley, and on the plateau near the mountain there is a large coffee plantation.

Dangers.—The Leak and Pinda Rapids present difficulties to the navigator, the former being about 35 miles above the mouth and 1 mile above the Ziu-Ziu, or channel westward of Inyangoma Island, with which it connects. The Leak is about 80 feet wide, and at right angles to the Shire, and as in the dry season the water runs through it with considerable velocity, and the channel of the Shire is very narrow, and running close to the Leak, there is considerable danger of being sucked down this narrow rapid, and both anchors should be ready.

Pinda Rapid, about ½ mile above the Leak, constitutes a danger from a sharp turn, and an accelerated current caused by the channel being narrowed by a rocky islet; the western channel is the navigable one, keeping near the river bank, but both the Leak and Pinda Rapids can only be considered as dangers when descending the river.

Communication.—A telegraph wire between Pinda and Muterara, continued along the northeast bank of the Zambezi, crosses the river at Pinda Rapids, the wire being fairly low.

S Bends.—Above Pinda there is a clear run through the Morumbala Marsh to Shuonga, the river being tortuous, particularly at the S Bends, which are at the head of the Morumbala Marsh, and are so called from the succession of very sharp and narrow turns in the river; the water is deep, but when the river is in flood the stream is strong, rendering extra care necessary when descending.

Above S Bends the river widens, the curves are less sharp, and signs of cultivation, which are absent in the marsh, again appear; the country on the right bank is wooded.

Two flats, with very little water over them in the dry season, have to be passed before reaching Port Herald.

Port Herald, or Juan Makanga, the first British settlement on the west bank of the Shire, and a fairly large village, can be reached from Morumbala in about 12 hours, avoiding anchoring in the Morumbala Marsh, an unhealthy district.

Communication.—Port Herald has railway communication with Blantyre via Chiromo.

Wood may be obtained at Port Herald.

Above Port Herald, the river loses much of its previous monotonous character, numerous islets being dotted about, and trees with heavy creepers overhanging the water; on either hand are ranges of hills, Mount Clarendon (Chipirone), 6,000 feet in height, being about 20 miles from the east bank.

Ruo River, a tributary of the Shire, and the boundary between British and Portuguese territory, is 100 yards wide and navigable for canoes for about 12 miles, where rapids begin.

Chiromo, a settlement on the northern side of the mouth of the Ruo River, is about 25 miles in a direct line above Port Herald.

Coast.—From West Luabo River to the mouth of the Chinde River, a distance of about 40 miles, the projection of the coast line forming the delta of the Zambezi River, is due entirely to the alluvial deposits of ages from that river.

From the mouth of the Chinde River the coast, trending northeastward for about 40 miles to Kiliman River, contains the mouth of several streams, and is so low that it is seldom seen from the deck of a vessel from a distance of 7 miles, although between the Malindo River and Linde River it becomes somewhat higher, and near the latter are some clumps of trees, while a short distance to the southwestward of the river some sandy cliffs, separated from the beach by a long lagoon, are conspicuous with the morning sun.

Inhamhona River mouth is close northeastward of the Chinde Entrance, and within it branches off in many directions, one to the southwestward, passing inside Mitaone Island, and throwing out a branch to the westward, which bifurcates and forms the Inhamacatiua and the Inhaombe Rivers, while the Inhamiara or Maria River branches out at the northwest point of Mitaone Island, and to the northward are the Inhamgona and Zunde Rivers. All of these are little known.

The general depths along this coast are 4 fathoms at about 3 miles, and from 6 to 9 fathoms at from 5 to 6 miles, but shoaler water may be expected off the entrances to rivers, and, as the soundings are few, it is not advisable to close the coast too much when navigating it.

Linde (Indian River).—The entrance to Linde River, about 26 miles northeastward of the Chinde Mouth, the Malindo River being about midway, is nearly 2 miles in width between Dehea and Linde Points, the former having low vegetation, with sand to the southward of it, and the latter marked by coconut palms; within the bar is a large estuary with several islands.

The river was ascended in 1822 for about 16 miles, the least depth being 2 fathoms, while in the Mondene or Chica River, on the northern side of the estuary, the depths were found to be from 5 to 10 fathoms when it was ascended by boats for a distance of 12 miles. Besides these other streams connect the Linde with the Kiliman River.

Beacon.—A white triangular-shaped beacon stands on Linde Point.

Bar—Depths.—Shoal water extends from each point of entrance, and, connecting about 4 miles outside, forms the bar, which is very short. The depth on the bar is about 6 feet at low water, but it is subject to change. The river for a distance of about 50 miles has from 2 to 10 fathoms.

Pilots.—A pilot for the river may be obtained at the anchorage.

Anchorage.—The anchorage, southeastward of Dehea Point, is in a depth of about 4 fathoms, and the beacon in line with an isolated palm to the southward of those on Linde Point, bearing about 338°, was said to lead over the bar in the best water.

Coast.—From Linde River to Kiliman River the coast is covered with vegetation, with several low sand hills and reddish-colored patches, and about 2½ miles northeastward of the former river is a low but remarkable bluff. The depths appear to decrease gradually to the shore, but the locality has not been closely examined.

Kiliman (Quilimane) River, entered about 3 miles north-northeastward of Vilhena Lighthouse and between Ponta Olinda (Hippopotamus) and Tangalane Point, which are nearly 2 miles apart, has low, sandy land covered with trees or jungle on both sides of its entrance, the southwest side being somewhat the higher of the two.

The entrance is conspicuous on a bearing about 328° and when abreast of it the river, being wide and having a straight course for 10 or 12 miles, no land will be seen from the deck between the entrance points, although Ilha Cavallos Marinhos, 4 miles within the entrance, may be seen from aloft.

Light.—Vilhena Lighthouse, situated about 4½ miles southwestward of the entrance to the river, is a red latticework pyramidal tower 78 feet in height, with a white cupola. It exhibits at an elevation of 103 feet above high water a fixed white light, which should be visible in clear weather from a distance of 12 miles.

Leading lights.—Two pairs of leading lights are exhibited for the purpose of leading into the river.

The first pair, situated nearly 1 mile southward of Ponta Olinda, are shown from beacons, both lights being fixed white; they are in line bearing 313° and visible 7 miles, but they have been reported to be irregular.

The second pair of lights, shown from Tangalane Point, are each fixed white, and visible in clear weather from a distance of 7 miles, the rear light being situated 22°, distant 200 yards, from the front light.

Signals.—There is a semaphore near the light structures on Tangalane Point, and a copy of the International Code of signals is kept there; but as it is doubtful if they are properly understood by the light keeper, it would be advisable, if wishing to communicate, to land and investigate.

Bar.—A bank named Cavallos Marinhos extends about 3 miles southeastward to the 3-fathoms contour line, from the coast southwestward of Ponta Olinda, and from Tangalane Point, a bank of the same name stretches 3¾ miles to the southward, and is said to be extending; between the points of these banks is the bar, the outer edge of which is 4 miles southeastward of Ponta Olinda light beacons.

The bar, which is from 800 to 1,000 yards in width, varies in different seasons, and especially after southwesterly gales; it is generally smooth at high water.

Islands and banks.—Ilha Militao, about 1 mile northwestward of Ponta Olinda, is formed of mangroves, and has a conspicuous casuarina tree on its southeast side; Banco Militao, extending about 1½ miles eastward of the island, its east side forming the west side of the channel, is separated from Ponta Olinda by Olinda Channel, which passes between the west side of Ilha Militao and the western shore.

Ilha Cavallos Marinhos (Pequena), 1½ miles northward of Ilha Militao, with Militao Channel and Banco Simplicio between, is low and covered with dense jungle, and has banks with islets on them extending 1¼ miles southward and northward nearly to the town, the channel being between them and the western shore.

Channels.—Within the bar the channel trends north-northeastward, passing close westward of the east bank of the river, and between it and Banco Militao, and at 1½ miles within Tangalane Point it turns west-southwestward, forming Militao Channel between the north side of Banco Militao and Banco Simplicio; from this the channel follows the west bank of the river close-to.

Buoys.—A black and white horizontally striped fairway buoy, surmounted by a white triangle, is moored in a position approximately 4¾ miles southeastward of Ponta Olinda beacons.

Tangalane 1, a black spar buoy, having a cylindrical topmark, is situated on the edge of the bar, on the southwest side of the leading line over it.

Cavallos Marinhos, a similar buoy, is moored about 1 mile northwestward of the preceding buoy, and on the southwest side of the leading line across the bar.

Tangalane 2, a red spar buoy surmounted by a triangle, pointing downwards, is moored on the western edge of Tangalane Bank.

Olinda, a black spar buoy, with a cylindrical topmark, is situated $1\frac{2}{10}$ miles southeastward of Ponta Olinda.

Within Tangalane Point the channel is marked on the port hand by black spar buoys, surmounted by cylindrical topmarks, and on the starboard hand by red spar buoys with triangular topmarks.

Outer anchorage.—Good temporary anchorage may be obtained in a depth of about 5 fathoms, with the rear-light structure on Tangalane Point bearing 338°, or from ½ mile to 1 mile eastward of the fairway buoy; but if remaining any time it would be better to anchor farther northeastward, off the edge of Tangalane Bank, as in this position there is said to be less sea, tidal stream, and current.

Beacons.—On the east bank of the river, about 1½ miles north-northwestward of Tangalane Point, are two beacons, about 1 cable apart which, in line bearing 63°, lead through Militao Channel.

Another pair of beacons, situated on the west bank of the river, and 1¼ miles north-northwestward of Ilha Militao when in line bearing 314°, lead between a bank extending from the western shore and the southwest side of Banco Simplicio.

The beacons and buoys are moved when necessary to meet the constant changes in the bar and in the channels.

Depths.—The bar had depths of from 12 to 13 feet over it in 1910, at low water, spring tides, between the first two buoys, and about 24 feet at high water, but these depths can not always be depended on; within the bar the depths increase, and at the entrance westward of Tangalane Point they are from 22 to 56 feet at low water, continuing thus until nearing the line of the first pair of beacons, but decreasing to 24 feet in Militao Channel. In the channel along the west bank of the river they are from 20 to 40 feet, decreasing to 8 and 10 feet when nearing the town.

Pilots.—A pilot is obtainable for the river between Tangalane Point and the town, but not for the bar, and pilotage is compulsory on merchant vessels.

Tug.—A small steam vessel is sometimes available for towing vessels.

Directions.—Approaching Kiliman a vessel may proceed along the coast at a distance of from 5 to 6 miles from it, and the light structures and beacons, with the appearance of the river, already mentioned, will point it out, but unless having local knowledge the bar should not be attempted until it has been examined.

Having arrived at the fairway buoy, the beacons southward of Ponta Olinda should be brought in line, bearing 313°, which will lead across the bar, passing northeastward of Tangalane 1 and Cavallos Marinhos buoys, and when the light structures on Tangalane Point come in line, bearing 22°, alter course for them, passing westward of Tangalane 2 and eastward of Olinda buoys.

When about 1 mile from Tangalane Point a course 339° should be steered to pass nearly ½ mile westward of it, and this course, passing eastward of two black spar buoys, will lead to the line of the beacons on the east bank, which should be used as a stern mark, bearing 63°, and steering 243°, through Militao Channel, leaving the red buoys on the starboard and black buoys on the port hand.

When turning on to this leading mark, the black spar buoy marking the northeast extreme of Banco Militao should be rounded closely, if the in-going stream is running, to avoid being set by it to the northward, and, having passed to the southward of the red buoy marking the south extreme of Banco Simplicio, bring the beacons on the west bank in line bearing 314°, which will lead between the west side of that bank and the western shore.

Above this the channel is about 300 yards off the western bank of the river, but it would be prudent for a stranger to employ a pilot, who could be taken on board at Tangalane Point.

Caution.—The above directions and the bearings of the leading marks given are only in agreement with the latest information available, and considerable changes may have taken place since that was received, therefore caution is necessary. It is stated that the breakers are a better guide to the position of the channel than the plan.

Great caution is required if crossing the bar in a boat, as the breakers are treacherous, and sometimes a solitary wave coming in may break heavily on the bar where the water appeared to be smooth immediately before; this has been the cause of the loss of several lives.

Anchorage.—There is anchorage, in a depth of 42 feet, to the northward of the entrance to Militao Channel and westward of the leading beacons on the east bank, also off the town in from 19 to 25 feet; vessels can also anchor in almost any part of the channel.

Landing.—A landing jetty, close to the customhouse and Government offices, is available at all stages of the river.

Tides.—It is high water, full and change, at the bar at 4 h. 37 m.; springs rise 12 feet, neaps rise 7½ feet. The tides are said to be irregular and felt for a distance of 50 miles up the river.

Tidal streams.—The in-going stream, after running over the bar, when nearing Tangalane Point, sets directly on to the banks on the west side, rendering great caution necessary; in the river the streams attain a velocity of about 3 knots.

Current.—Outside the bar and along the coast the current generally sets to the southwestward, at rates of from 1 knot to 2 knots, causing vessels at anchor off the bar to lie broadside to the swell and to roll considerably.

Winds.—The prevailing wind off the river is from southeast to south during the greater part of the year, being sometimes to the westward of south between January and March. In October, winds from south-southeast to east-southeast have been found to blow throughout the night, lulling in the morning, but this is unusual, as a land wind generally springs up at night. Off the town in July the sea breeze from south-southeast sets in about noon, with a force of from 1 to 3, but during the night it is usually calm with the land wind in the morning.

Town.—The town of Kiliman, standing on the east bank of the river at about 10 miles above Tangalane Point, is surrounded by coconut palms, the church and barracks being conspicuous buildings; the population of the district in 1910 was 530,482, of which number about 527,000 were natives.

Communication.—The Union Castle and Messrs. Rennie Lines of steamers have regular services to Kiliman, and it is connected with Maquival, on the Macuse River, by a short railway about 18 miles in length, while a railway to be constructed to the western frontier was commenced in 1913; there is a submarine cable to Mozambique, and telegraphic communication by land wires via Tete and Salisbury, with Fort Johnston and the general South African system.

Supplies of fresh meat, bread, and vegetables are very limited, and no supply of water for shipping exists, while that obtained from wells is both scarce and bad.

Repairs.—Slight repairs to small vessels, such as carpenters', blacksmiths', and calkers' work, can be effected at reasonable rates.

Hospitals.—In addition to a general hospital, one for infectious diseases is maintained outside the town, and is attended by a Government medical officer with a staff of European and native assistants.

Trade.—The exports consist of oil seed, groundnuts, sesame, copra, rubber, beeswax, ivory, gold dust, sugar, and native tobacco, and the imports of cotton and printed goods, beads, brass wire, implements, provisions, wines, sugar, etc., while owing to the construction of the railway a large amount of material for it will be imported. A factory is capable of turning out a considerable amount of coconut fiber annually.

Climate.—The climate is unhealthy for Europeans, although sometimes the temperature is not exceedingly high, as 62° F. has been registered in an early morning in the month of July. The rainfall averages from 30 to 40 inches, being heaviest in January and February when rain is sometimes accompanied by a considerable amount of lightning; light rains occur in May, June, and November.

CHAPTER VII.

MOZAMBIQUE CHANNEL—KILIMAN TO CAPE DELGADO.

Coast.—The whole of the coast described in this chapter is Portuguese territory, and the native inhabitants from Kiliman to Cape Delgado are chiefly of the Makua Tribe. About 14 miles northeastward of Kiliman River is the first patch of casuarina trees seen on this coast in proceeding northeastward, the lofty trees on the intervening space being all palms or coconut. As far as Cape Fitzwilliam, nearly 90 miles from Kiliman, the coast is low and sandy, with jungle in the background.

Brisk Bank.—The depths along this coast as a rule decrease regularly and very gradually on approaching the land, but there are several off-lying banks, as presently described, the first of these being a rocky bank of 7 fathoms and perhaps less water about 12 miles south-southeastward of Macuse River.

Rivers.—There are nine rivers between Kiliman and Cape Fitzwilliam, viz, the Macuse, Mariangoma, Mumwodo, Likugu, Mwabala, Raraka, Mazemba or Mriazi, and Monuga or Kizungu. The Macuse and Monuga are accessible to light draft vessels.

Macuse River, about 22 miles north-northeastward of Kiliman, has a patch of casuarina trees standing on its western point of entrance, the eastern point being somewhat bluff. It is navigable for vessels of 12 feet draft for about 25 miles from the entrance, and at 40 miles from its mouth it communicates with Kiliman by the Liquare (Likwah) River and a canal. Chico Village is about 9 miles, and Muxixine, a small fort about 35 miles up the river, and near the latter Villa Candida Village is up a small creek.

Bar—Depths.—The bar, about 1 mile in breadth and nearly 5 miles offshore, connects the banks, which sometimes break heavily, at about the same distance off both points of entrance; the bar is subject to change.

In 1913 the bar had a depth of 8 feet at low water and 22 feet at high water, springs, on the leading mark; within the bar the water deepens to 5 and 9 fathoms.

Beacons and buoys.—Two beacons stood on the eastern bank of the river in 1913, and the channel across the bar was marked on the northeast side by a red buoy and on the southwest side by a black buoy.

Directions.—In 1913 the leading mark for the bar was the palm trees inland of and projecting over the other trees on the same side as Namerrumo, in line with the northernmost casuarina tree on the western bank; then steering a course midway between the two buoys on the bar until the leading beacons on the east bank come in line, alter course for them and continue until close to the eastern bank of the river, which should be followed as far as Port Macmahon.

Anchorage in a depth of about 3¼ fathoms may be obtained off Port Macmahon Village.

Tides.—It is high water, full and change, in Macuse River at 4 h. 30 m.; springs rise 14 feet, neaps rise 12 feet.

Tidal streams.—The in-going stream sets westward and the other stream in an opposite direction, and caution is necessary to guard against these streams when crossing the bar.

Communication.—Maquival Fort, about 16 miles from the entrance, is connected by rail with Kiliman, and there is telegraphic communication.

Supplies.—Only fruit and fresh water may be procured.

Mariangoma River, 6 miles northeastward of Macuse River, appears to be of no consequence, and nothing is known as to its entrance and bar, but about 2 miles inland it branches off eastward and westward, the western branch entering the Macuse at Port Macmahon and the eastern branch joining the Mumwodo River about 5 miles from its entrance. This latter river, 11 miles northeastward of Macuse River, has a broad shallow entrance, but is also of no importance.

Likugu (Licungo) River, rising in the hills southeastward of Kilwa Lake, is one of the largest of the nine rivers mentioned on the preceding page, but its bar is stated not to be passage, and there is no late information concerning it; within the bar the river is said to be navigable for boats for 8 or 10 days' journey.

Mazemba (Mriazi) River, about 36 miles east-northeastward of Likugu River, had such a shallow bar in 1899 that it could be waded at low water, and seemed sometimes to be unsafe for boats to enter, but there are depths of from 20 to 30 feet in the river as far as where it is joined by the Nababi; hippopotami abound in the river.

Several other streams run into the Mazemba, with entrances so wide that they are not easily distinguished from it.

Supplies may be obtained by barter from the natives at the entrance of the river.

Port Pebane—Monuga (Kizungu) River.—Kizungu Island, which is somewhat higher than the adjacent coast, and is of a hummocky appearance, separates the entrances to Mazemba and Monuga

Rivers, 6 miles apart, but these rivers are connected by a 2-fathom channel passing northward of the island; the increased height of Kizungu Island, and the bold appearance of Cape Fitzwilliam, render the entrance to Monuga River more easily distinguished than that of Mazemba River. The estuary of Monuga River is known as Port Pebane.

The entrance to the river is bordered by mangroves, but on the east point of Kizungu Island is a clump of trees, with two tall isolated trees 400 yards from the clump, and close southward of these two trees is a bare-topped sand hill. Inland there is soon a change to fine open country, with numerous indications of the existence of large game.

Shoal water extends a considerable distance off the river, and at 5 miles off there is a depth of 5 fathoms; above the anchorage within the bar, the river soon becomes shallow, but is navigable for dhows and boats for about 20 miles from its mouth.

Bar—Depths.—The bar is said to extend about 3 miles off, and from the last information it had a depth of 13 feet at low water, spring tides, but its direction and depth are continually altering.

Beacons.—Two white beacons lead over the bar, the front, triangular in shape, with a diamond topmark, being situated on Maverani Point.

The rear beacon, the lower part of which is square, and upper part triangular, is near the flagstaff of Pebane military station.

Buoys.—A black and white horizontally striped conical fairway buoy, moored in a depth of 6 fathoms, on the line of the leading beacons.

The bar is marked on its eastern side by a red buoy, and on its western side by a black buoy.

Within the river the channel of the river is marked by three buoys.

Directions.—The beacons in line do not appear to lead across the bar, owing to the impossibility of placing them in the requisite positions, so that when entering, the rear beacon should be kept open westward of the front beacon, passing between the red buoy on the starboard and the black buoy on the port hand; it is stated that, as shoal water extends from the southwest side of the entrance, Maverani Point should be rounded at from 40 to 50 yards distant, the three buoys pointing out the channel.

Anchorage.—Within the entrance is a fine landlocked anchorage in depths of from 8 to 9 fathoms, which is said to be the only port of any consequence between Kiliman and Angoche Rivers, and perhaps superior to either.

Tides.—It is high water, full and change, in Monuga River at 4 h. 30 m.; springs rise 13¼ feet.

Cape Fitzwilliam, about 5 miles eastward of Monuga River, is a remarkable bluff, composed of yellow earth cliffs, with a few rocks around them on the beach. This cape and Cape Edward are the most remarkable points along this part of the coast.

Light.—On Cape Fitzwilliam is a square iron tower, 30 feet in height, which exhibits, at an elevation of 165 feet above high water, a white flashing light, visible in clear weather from a distance of 19 miles.

Cape Edward, a bluff formed of red earth cliffs, with a sandy beach and a few rocks at the base of the cliffs, is 6 miles northeastward of Cape Fitzwilliam, the land between being very low, with Mlai River about midway.

Coast.—From Cape Edward to Macalonga Point (Ras Nelide), about 46 miles eastward, the coast is nearly straight, and between these points are the Namanue and Mlela streams entering the sea on either side of Yusi Island, while 9 miles farther eastward the Laura and the Mumbazi or Maravoni have one mouth; in the remaining 32 miles are the Molugwi, Mwalaka, Blanche, and Eredni.

Between Eredni River and Macalonga Point, the coast consists of low sand hills with scattered trees, and on the northern side of the Eredni, within its mouth, is a red cliff which may serve to distinguish it. Little is known of the above-mentioned streams, and this stretch of coast has been but sparsely sounded.

Namanue (Yusi) River, the western mouth of the Mlela, is fronted by a bar over which there are apparently two channels, divided by a breaker, the eastern channel being that used; within, the river widens considerably, with room and sufficient water for small vessels.

The depth on the bar at low water is 6½ feet, so that vessels of 13 feet can cross it, and the anchorage in the river is used by small coasting steamers, as there are depths within of from 9 to 29 feet.

Beacon.—A triangular beacon stands on the eastern side of the entrance to the river.

Directions.—A vessel intending to enter the river should anchor outside the bar to ascertain the exact position of the center breaker, also, if possible, to buoy the channel. When entering the river a dead tree eastward of the beacon should be steered for 20°, passing the breakers in the middle from 50 to 100 yards off, leaving them on the port hand, and then altering course to 346° for the beacon, continuing until a little more than 200 yards from the shore, when steer 334° for the anchorage.

Anchorage off the bar may be obtained in a depth of 8 fathoms, with Cape Edward bearing 262°, distant nearly 14 miles. Off Yusi village there is anchorage space for one vessel in a depth of 14 feet, over a muddy bottom.

Tides.—Springs rise 11¼ feet. The tidal streams have velocities of from 4 to 5 knots, and it is said that the bar is smoother with the in-going stream.

Village.—Yusi village, situated about ¾ mile northward of the mouth of the river, may be known by a white house; there is a small garrison, and mangrove bark is exported.

Mlela River has a bar extending about 900 yards off its mouth, the channel over it being somewhat narrow and winding; little is known of the navigation of the river, except that it is connected with the Mumbazi River by Icaloane Canal, and that a network of waterways exists between it and Moma River, about 60 miles northeastward, and are navigable by boats. Anchorage off the river is not recommended. The depth on the bar at low water is 5 feet.

Tides.—It is high water, full and change, at 4 h. 15 m.; springs rise 9¾ feet; neaps rise 7¼ feet.

Village.—Yudi village, with a small garrison, is in a small creek on the west bank of the river, about 1 mile from the mouth.

Mumbazi River, about 18 miles east-northeastward of Mlela River, is fronted by a bar, and has an island lying in its mouth, with a sandbank extending from it to the entrance, which is thus divided into two. The northwest bank of the river is high, and has luxuriant vegetation, the whole surrounding land being fertile; the southeast bank is low, marshy land, intersected by mangrove-fringed creeks.

The depth on the bar at low water in 1913 was 12 feet, and the river has been entered by fairly large vessels.

Beacons.—Two beacons, when in line, lead over the bar, the front beacon, white triangular, 16¼ feet high, and surmounted by a ball, being on Ponta Almadia, the eastern point of entrance.

The rear beacon, white rectangular, and 16¼ feet high, is situated in Cacoane village near the mouth of the river.

Buoys.—A black and white horizontally striped conical buoy is moored in a depth of 6 fathoms as a fairway buoy.

The southern side of the bar is marked by a black cylindrical buoy.

Directions.—From the fairway buoy the entrance should be steered for, and when the black buoy is passed, keep to the westward, entering by the channel between the breakers and the shore.

Primeira Islands—Shoals.—The Primeira and Angoche Islands and shoals are on the outer edge of a coral bank fronting the shore at a distance varying from 5 to 25 miles. The channels between them and the mainland have depths of from 7 to 11 fathoms, the deepest water being near the islands.

Pantaloon Shoals, the southwesternmost of these groups, are about 2 miles in extent, and, besides the shoalest spot of 3½ fathoms, situated about 180°, distant 23 miles from the entrance to Mazemba

River, have two patches of 6 fathoms. A 6-fathom patch lies 5 miles eastward of the 3½-fathom shoal; these shoals are steep-to.

Acorn Patch, on which the British naval vessel *Acorn* touched lightly in 1840, is situated about 21½ miles 180° from Cape Fitzwilliam; it has depths of from 9 to 13 fathoms about 1 mile to the southward, and a sounding of 5½ fathoms was obtained near it by the British naval vessel *Dart* in 1852, but the sea was breaking a short distance from this. It has not been closely examined, and should be avoided.

David Shoals consist of two rocky patches, the northeastern, of 3½ fathoms, being nearly 21 miles east-northeastward of Acorn Patch and 23 miles 150° from Yusi Island; the southwestern patch, of 8 fathoms, lies about 3½ miles in a southwest direction from the northeastern one.

Silva (Mahiazo) Island, a bare sandy islet about 10 feet high, is the southwesternmost of the Primeira Islands; it is surrounded by reefs extending about 1,600 yards from it. The depth between Silva and Fogo Islands is about 14 or 15 fathoms.

Fogo (Malibono) Island, 5 miles northeastward of Silva Island, the channel between having 14 or 15 fathoms, is 30 feet high, with a few trees about 65 feet high on its northern end, the other parts being covered with shrub; it is surrounded by a reef which extends about 1 mile, except on the northern side, where it is bolder.

Anchorage may be obtained, in depths of from 5 to 6 fathoms, at ½ mile from the beach on the west side, or a vessel may anchor in 10 fathoms, at 600 or 800 yards from the beach, with the center of the island bearing from 156° to 178°. When standing from the mainland toward the anchorage, the soundings suddenly deepen from 10 to 20 fathoms, and again quickly shoal to 10 fathoms at about ½ mile from the island.

Crown Island, 20 feet high, and composed of sand with a little grass on it, is about 4 miles northeastward of Fogo, and is surrounded by reefs ½ mile wide. The channel between Fogo and Crown Island, and also between the latter and Casuarina Island, is clear, with from 10 to 12 fathoms water.

Shoal.—About 7 miles east-southeastward of Fogo Island the British steamer *Sokotra*, in 1880, passed over the edge of shoal ground in a depth of 8 fathoms, breakers at the time being observed about ¼ mile distant to the westward.

Casuarina (Tanibi) Island, lying nearly 10 miles northeastward of Crown Island, was formerly covered with casuarina trees, which were high, the tops being about 80 feet above the sea, particularly near its northeastern end; the few trees remaining are not allowed to be cut for fear of destroying a useful landmark. The reef surrounding the island extends from 2 to 3 miles northeastward, southward, and southwestward, with a clear passage about 1 mile wide between it and the reefs of Epidendron Island.

Tides.—It is high water, full and change, at Casuarina Island at 4 h. 15 m.; springs rise 10 feet.

Current.—The current or stream generally runs southwestward, but occasionally there is a set northeastward.

Epidendron (Maloa) Island, the northeasternmost of the Primeira group, lying about 6 miles southward of Macalonga Point, has on its northern part a few casuarina trees about 80 feet high, but the southern part is covered with short shrubs only; it may be seen from a distance of about 15 miles. Like Casuarina Island, it is surrounded by an extensive reef except on its northwestern side.

Anchorage may be obtained in from 4 to 11 fathoms on the northwest side of the island about 600 yards from it; at about 400 yards the depth is 2¾ fathoms or less water.

Barraco Reef lies about 3 miles northeastward of Epidendron Island, and another rocky patch, on which the sea breaks, is 2 miles farther in the same direction, but these dangers do not appear to have been examined.

Macalonga Point (Ras Nelide), low and sandy, has a reef extending eastward as well as south-southeastward from it.

Casuarina Road, between the island and the mainland, is the best anchorage along the coast, but shoal water, with depths under 3 fathoms, extends 4½ miles south-southeastward of Macalonga Point on the east side of the anchorage.

Directions.—If entering from the northward, Casuarina Island should be kept open westward of Epidendron Island, bearing 220°, to pass northwestward of Barraco Reef and the reef eastward of it; the depths are regular.

Anchorage, protected from southeast winds, may be obtained in a depth of 11 fathoms, about 1,600 yards from the west side of Casuarina Island, or at about ½ mile from it in 3½ fathoms, with the middle of the island bearing 135°.

Coast—Rivers.—Between Macalonga Point and Angoche, a distance of nearly 70 miles northeastward, the coast is somewhat low, covered with grass and detached clumps of casuarina trees, and bordered by sandy beaches; inland, between Moma and Laridi Rivers, is the Serra Matadene, a chain reaching a height of about 1,100 feet.

Besides some minor openings on this coast are the Ligonya, Moma, Mwaladi, Laridi, Namakuti, and Natiti Rivers, the last mentioned being the southern mouth of the Angoche.

Mount Cockburn (Mlunguji), about 27 miles northwestward of the entrance to Moma River and the only mountain seen on this part of the coast, is a remarkable cone of considerable height.

Moma River, about 18 miles northeastward of Macalonga Point, may be known by Mount Cockburn, and the Serra Matadane, Moma Island, and Ponta Caldeira being also guides to its entrance. It is the most important river on this part of the coast and has a wide mouth, expanding within, and having several tributaries running into it, the eastern of these being the Cocola River, which is navigable for 6 miles.

Bar—Depths.—The bar at the entrance of the Moma River is a long and heavy one, the channel, about ½ mile in width, lying between two banks extending from the two entrance points. The bar connecting the outer part of the banks has a least depth of 6 feet at low water, spring tides, of 15 feet at within one hour of and 17 feet at high water, increasing to 5 and 6 fathoms within the river, where a tortuous channel, amongst drying sand banks, leads to the Portuguese military station of Moma, about 3 miles from the entrance points, to which a vessel of 13 feet draft can ascend and anchor in 4 fathoms.

Directions.—If the tide suits, the early morning is the best time to cross the bar, but there are no navigational aids; the following directions may be of assistance: The eastern side of the channel should be kept, when entering, and having brought the mouth of the river well open, steer 270° for a white fence that will be seen about midway between the breakers on the reefs extending from each side.

Edge over toward the south side of the entrance, and then follow the east bank of the river until abreast a white triangular patch, and from this cross to the opposite bank, steering for a conspicuous tree until up to Moma military station. A vessel intending to enter the Cocola should keep toward the western bank before coming abreast of the white fence.

Anchorages.—In 1875 the British naval vessel *Thetis* anchored off this river, with Mount Cochburn bearing 308°, and Ponta Caldeira 47°, in 9 fathoms, sand and mud, good holding ground. The ship rolled heavily, being kept broadside to the swell by the prevailing current which at this season (August) always sets along the coast to the southwestward, with more or less strength. The heavy rolling sea from the southward, at times, had more the character of rollers on a bar than that which might be expected in an open roadstead.

The anchorage off Moma is about 200 yards in extent, with depths at low water of from 11 to 12 feet; there is also anchorage near the east bank, a little above the white triangular mark.

Tides.—It is high water, full and change, in Moma River entrance, at 4 h. 30 m.; springs rise 10 feet.

Villages.—Moma, the military station, situated on the east bank of the river, is surrounded by plantations and villages.

Trade.—There is a little trade with Parapat, in Angoche River, two small Portuguese colonial steamers calling at more or less regular intervals.

Ponta Caldeira, about 15 miles east-northeastward of Moma River, is rather higher than the adjoining coast, and is fronted by a ledge of flat rocks, dry at low water, with a large black rock lying about ½ mile northeastward of the point. On the coast about 7 miles northeastward of Ponta Caldeira is a conspicuous hill nearly 250 feet high, which may be seen from about 20 miles seaward.

Laridi River, 14 miles northeastward of Ponta Caldeira, has a depth of 3 feet on its bar at low water, and small vessels enter and anchor off Talanane village within its mouth; the river is connected by two waterways, with the Namakuti River, about 3 miles northeastward.

Ponta Angoche, about 25 miles northeastward of Ponta Caldeira, is a low projecting white sandy point, on which are a number or small sand hillocks, conspicuous from a considerable distance; it is bordered by a dry sand bank in the form of a crescent at a distance of about 1 mile.

Westward of the point is Natiti (Kwilua) River, much frequented by coasting vessels which find good sheltered anchorage off Munuca village within the mouth, the entrance channel being between two sand banks, the limits of which are well defined at low water, when there is no difficulty in entering.

Ilhas Angoche—Moma Island (Fungu Koru), lying 8 miles southward of Ponta Caldeira, is a sandy island about 20 feet high, surrounded by reef extending more than ½ mile southward from it.

A 5-fathom bank was reported in 1843 to lie 9 miles southwestward of Moma Island, and another small bank is charted 2½ miles from the island in the same direction.

Caution.—The soundings between Moma and Caldeira Islands are irregular, and with Caldeira and Hurd Islands in line, the water shoals in one place to 7 fathoms, the bottom being plainly visible; it is possible that less water may exist.

Ilha Caldeira (Kirubi), lying nearly 12 miles eastward of Ponta Caldeira, is small, sandy, and has a few casuarina trees; it is surrounded by reefs extending off about 1 mile, except on its northern side. There is tolerable anchorage northwestward of the island, about ¾ mile from the shore, in a depth of about 8 fathoms, over coral, sand, and mud.

Hurd Island (Njovu), lying nearly 6 miles northeastward of Ilha Caldeira, is low, sandy, and covered with trees; reefs extend about 1½ miles from all sides except the north. There is anchorage sheltered from south and southeast winds, in depths of from 6½ to 8 fathoms, about 400 yards from the northwest side of the island.

Michael Reef (Fungu Namakuti), lying 5 miles northeastward of Hurd Island, and about the same distance from the mainland, is a dangerous reef of rocks uncovered at low water, and 1½ miles in extent, which should be given a wide berth.

Walker Island (Puge-Puge), lying 2½ miles south-southeastward of Ponta Angoche, at high water shows only as a small sandy cay, 6 or 8 feet above the sea; except on the north it is surrounded by reefs which, in some places, extend 1¾ miles.

Mafamede Island (Kisiwa Sultani Hassan), lying about 8½ miles northeastward of Walker Island, and nearly abreast of the mouth of the Rio Angoche, is a low sandy island, about 700 yards in length, with a group of casuarina trees about 80 feet high, and may be seen from 12 to 15 miles distant; a coral reef extends from 1½ to 2 miles except on the west side, and on its northwestern side the shore is fairly steep and the landing good.

The British naval vessel *Brisk* found good, safe, but not very smooth anchorage, in a depth of 10 fathoms, with the center of the island bearing 134°, distant 1,800 yards, and the extremes of reef, dry at low water, bearing 89° and 168° but a berth nearer the island may be chosen if desired.

Caution.—It is very desirable that the trees on this and similar islands should not be cut down for firewood, as they are extremely useful in showing their position.

A sand patch, 100 yards in extent, with a least depth of 3 fathoms, lies 1½ miles northwestward of the center of Mafamede Island, and another patch with 5 fathoms lies 600 yards eastward of it.

Rio Angoche (Mluli), the entrance to which, about 3 miles in width, is situated to the northward of Ilha Angoche, has some large trees on its southern point of entrance, 3 miles southward of which is another clump of trees, with a large village between; the land on the north side is a low, sandy cliff, surmounted by trees, but is somewhat higher than the south side.

Janga and Busio Islands, lying off the northeast side of Ilha Angoche, on the south side of the entrance, have an extensive sandy bank, more than 2 miles in width, extending for about 3 miles eastward of them, and from the northern point of entrance, on which is a single casuarina tree, a sandy bank extends fully 3 miles east-southeastward, the bar and entrance channel being between the edges of these banks.

Bar—Depths.—The bar of the river, which extends nearly 4 miles east-southeastward of the northern entrance point, is about 600 yards in width, and in 1907 was reported to be shoaling, there being then only a depth of 6 feet on it at low water, spring tides, on the line of the leading marks.

Within the river the depths increase to 9 fathoms at the anchorage northward of Busio Island, and at 4½ miles from the bar the river bifurcates, both branches being wide and deep; the southern of these, maintaining a depth of 4 fathoms for about 20 miles, is said to be navigable for small craft for a distance of 150 miles.

Beacons.—Two white pyramidal-shaped beacons 40 feet high are situated on the north side of the entrance, the inner beacon standing on a hill northeastward of Parapato, while the outer beacon is near the beach; they are about 2.3 miles apart and in line 302°.

Buoys.—In 1907 the bar was marked by two buoys, the outer a small red can buoy with a red topmark, and the inner, on the northern edge of the south bank, was a black cylindrical buoy.

Semaphore.—A semaphore is situated near Parapato, about 1 mile southwestward of the inner beacon.

Pilots.—The services of two pilots are available, and no stranger should attempt to cross the bar without one.

Outer anchorage.—The outer anchorage is close outside the bar, in depths of from 4 to 5 fathoms, with the northern side of Busio Island bearing 275°, or farther to the southward, but not far from the edge of the bank; large vessels anchor farther out in a depth of about 7 fathoms.

Directions.—Mafamede Island, bearing 161° will lead to a position off the bar, keeping a good lookout for any appearance of breakers, as nearly 1 mile outside it are patches of comparatively shoal water, which sometimes break, but as they can usually be seen they may be avoided; breakers mark the bar on each side, but only with a moderate swell, and near high water the bar is generally smooth all over.

The leading beacons in line bearing 302° should lead across the bar, between the red and black buoys, and then bring the single casuarina tree on the northern point of entrance in line with a large red patch on the semaphore hill, about 294°; after crossing the bar keep toward the northern shore of the river and pass into the nothern branch, keeping eastward of a rocky patch on the extreme of shoal water extending from the western side, and nearly in mid-channel of its entrance, sometimes marked by a buoy.

A winding boat channel westward of Busio Island, marked by breakers on each side, may be used advantageously when leaving the river in moderate weather, and at the west of that island is a sheltered place, with smooth water, where boats can lie alongside a steep sandy beach in a depth of 3 fathoms.

Caution is required if it should be considered necessary to sound the bar, as it is sometimes dangerous to do so.

Anchorage.—The anchorage for vessels of war at Parapato is northward of the landing pier, and that for merchant vessels to the southward of the same. Vessels in quarantine anchor northward of the pier, clear of the anchorage for vessels of war, as directed by the port authorities.

Tides.—It is high water, full and change, in the entrance to Angoche River, at 4 h. 0 m.; springs rise 11 feet.

Settlement.—Parapato (Antonio-Ennes), on the eastern bank of the river just within the northern branch, is the chief Portuguese settlement on the river and the residence of the military commandant, there being barracks. Angoche, the former capital, is in a creek inaccessible for boats before half tide, unhealthily situated on the southern bank, about 20 miles up the river.

Communication.—Coasting steamers touch irregularly, and there is telegraphic communication.

Supplies.—Cattle, goats, fowls, eggs, and fruits can be procured from the natives of the various villages on the banks at reasonable prices.

Trade.—Rubber, ivory, ebony, seeds, gum copal, coconut oil, coir, and groundnuts are the products, and in the year 1910 the port was visited by 139 vessels, with an aggregate tonnage of 78,081 tons.

Winds.—The usual sea breeze varies in direction from east-northeast to southwest, according to the monsoon, and in November it blows freshly from east-northeast, falling light at night, and changing to north-northeast in the early morning; at this season of the year strong southwest winds with a heavy swell, and rainy weather, occasionally occur, this being the commencement of the rainy season.

Coast.—From Rio Angoche the coast, trending northeastward for nearly 20 miles to the south point of Rio Antonio, consists of sand hills, increasing in height to the latter river, where attaining from 300 to 400 feet in height, they have several patches of red sand. The land in the vicinity of Rio Antonio is remarkable, as these sand hills, partly covered with vegetation, and the north point of the river which is low and sandy, form a striking contrast to two rocky points 4 or 5 miles southward of the river.

Namduma Hills, from 2,000 to 3,000 feet high, are about 17 miles north-northwestward of the entrance to Rio Antonio, and should be conspicuous objects from seaward.

San Antonio (Veve, or Jamuguva) Bank is a coral bank, about 2¼ miles in length, in a northeast and opposite direction, by 1¼ miles in width; it has some sand patches, dry at low water, on its southwestern end, which are steep-to. The drying portion is charted 12 miles, 176°, from the south point of Rio Antonio, but it is reported to lie 4½ miles, 264°, from that position.

About midway between San Antonio Bank and the shore is a shoal of 3 fathoms or less water, and about 5 or 6 miles off the coast, abreast of Rio Antonio, are several patches of 5 fathoms, where the bottom is distinctly visible.

Caution.—At night it is advisable not to stand into a less depth than 20 fathoms between Angoche and Mozambique, as the banks are mostly steep-to and the coast is but imperfectly known.

Rio Antonio (Sangage), about 20 miles northeastward of Rio Angoche, may be known by the characteristics of the land near its mouth, already described, and by Namduma Hills. Its entrance is fronted by a bar apparently about 1 mile in breadth, with from 1 foot to 3 feet only at low water, and probably subject to change. Within the bar the river turns sharply to the southward, with depths of from 2 to 4 fathoms.

Directions.—The tamarisk trees on the northern point of entrance bearing 277°, are said to lead in the best water over the bar, and when the north side of the entrance bears 270°, the course should be gradually altered to the southwestward, but the channel is only about ¼ mile in width, not buoyed and there is no late information. A pilot may be obtained at the Rio Angoche for this port, but though his local knowledge may be useful, his pilotage should not be relied on.

Tides.—It is high water, full and change, at Rio Antonio Entrance at 4 h. 15 m.; springs rise 13 feet, neaps 10 feet.

Settlement.—About 3 miles within the entrance, on the southern shore, is the settlement of Shangaji, which carries on some trade with Mozambique, similar to that from the Rio Angoche, but of less extent.

Water of excellent quality may be procured here from springs close to the river banks.

Meige (Kinga) River, about 6 miles northeastward of Antonio River, has such a narrow entrance that it can scarcely be distinguished even at low water, but the flagstaff at the military station, and a small steep declivity on the south bank, point out its position; it is connected by telegraph and by road with Angoche and Mozambique.

Coast.—**Huddart Shoal** is 20 miles northeastward of Rio Antonio, and nearly 6 miles offshore; Capt. Vidal obtained a depth of 3¼ fathoms over it, but there appeared to be every probability of less water, as the sea sometimes broke on the shoal.

Namalungo Point, 26 miles northeastward of Rio Antonio, is a well-wooded sandy bluff, with a reef of rocks and sand fringing it to a distance of about ½ mile. From abreast of the point, the distant land behind appears rather high, and that close to the beach low and sandy, with a growth of casuarina trees.

Moginkwale (Muginquale) River, about 5 miles northward of Namalungo Point, is entered between Funco and Murano Points, ⅓ mile apart; a clump of casuarina trees is situated about ¼ mile northward of the latter point.

Bar—Depths.—Sand banks front both points of entrance, reducing the width of the navigable channel to about 200 yards. In 1887, a least depth of only 2 or 3 feet was found on its bar at low water, and of 2½ fathoms at high water, springs, but there were often heavy rollers on the bar without any apparent cause.

Directions.—According to the plan the western side of the clump of casuarina trees bearing 345° leads across the bar, but the direction of the bar and channel probably changes, so that caution is necessary.

Tides.—It is high water, full and change, in Moginkwale River at 4 h. 0 m.; springs rise 13 feet.

Settlement.—The Portuguese have a military station here.

Chatapoota (Moginkwale) Shoal, lying off the entrance to Moginkwale River, and about 5 miles from the line of coast, consists of several rocky patches, on which the sea generally breaks; Macupe Shoal also belongs to this cluster, the extent of which is not accurately known, but there is a channel with depths of from 6 to 10 fathoms between them and the shore, passing outside the Barracouta Point Shoal but inside the Naquil and Bajona Shoals.

Barracouta Point, about 6½ miles eastward of Moginkwale Entrance, is low, overgrown with casuarina trees, one of which appears like a vessel, but the point is not easily distinguished except in the early part of the day, as there are other casuarina trees to the westward of it.

The point forms the northern point of Barawa or Manamitya River, which appears barred, and is of no importance; a horseshoe reef, extending nearly 2 miles from Barracouta Point, has 7 or 8 feet on some parts of it, but within the horseshoe, which opens northwestward, there are 5 fathoms.

Naquil Shoal, of unknown extent, lies about 6½ miles eastward of Barracouta Point; in 1875 the British naval vessel *Thetis* anchored in 15 fathoms over hard sandy bottom, about 1 mile eastward of Naquil Shoal, and found the bottom in the locality to be generally foul.

Tidal streams.—The south-going stream is that of the rising tide, the other stream setting in an opposite direction; the streams turned regularly.

Bajona Shoal, lying about 8 miles northeastward of Barracouta Point, and about 5 miles offshore, is a patch of rocks of unknown extent having 5 fathoms water or less, with 14 fathoms close-to.

Muite River—Infusse Bar.—Muite River is entered about 3½ miles north-northeastward of Barracouta Point, over Infusse Bar, which, being the most important entrance, sometimes gives its name to the lagoon system within; the entrance is between Tete Point, the northwest point of the island of the same name, and Sena Point, the southwest extreme of Timone Island, nearly 600 yards apart.

The Muite and other streams within the bar are usually navigable for dhows at high water, though crossing the bar is attended with some danger at all times. These streams are intersected by creeks lined with mangrove bushes, and divided by large tracts of low land, partly inundated, on which are several villages surrounded by cultivated land. Mokolivolane, on one of the southern streams, is apparently the principal village.

Beacon.—A beacon stands on Tete Island.

Bar—Depths.—The bar, which, from its breakers, is considered to be exceedingly dangerous, has about 4 or 5 feet water in a very tortuous channel at low water, and about 16 feet at high water springs. The beacon on Tete Island bearing 215° aparently leads over the outer part of the bar.

Tides.—It is high water, full and change, at Infusse Bar, at 11 h. 55 m.; springs rise 12 feet.

Nakibu Shoal.—From about 4 miles northward of Infusse Bar, the coast is fronted by foul ground, with patches of 1 fathom or less for a distance of 9 miles, at which distance it extends about 5 miles offshore, having at its northeast extreme Nakibu Shoal, a cluster of rocks 300 yards in extent, in parts uncovered at low water, and generally breaking heavily; its eastern extreme is 6¼ miles eastward of Mamarrema River. Ponta Bajone bearing 315° apparently leads well northeastward of it.

Ponta Bajone (Ras Mtende), low, sandy, and covered with trees to the beach, should be given a wide berth, and the coast northwestward from Ponta Bajone to Ras Kisarahondo (Mudge Point) is foul and apparently shallow.

Mokambo Bay is contained between Bajone and Sancoul Points, nearly 9 miles apart, the coast on both sides being foul for probably 1½ miles from the shore, and the reefs are steep-to; there is no bottom with 50 fathoms within ½ mile of the northern reefs and a depth of 450 fathoms in the entrance of the bay, so that it is unfit for anchoring, but the spacious basin of Port Mokambo, presently described, is at its head.

Mudge Reef, steep-to, extends about 1½ miles northeastward of Ras Kisarahondo, and, being in the fairway of the entrance, should be passed with caution.

Peel Bank, on the north side, extending about 1½ miles southward of some remarkable-looking rocks on the beach westward of Sancoul Point, is steep-to.

Port Mokambo (Kivolani Bay), an almost circular basin about 4 miles in diameter, is entered between Ras Kisarahondo and Ras Fugu (Mokambo Point), the entrance channel being about 1½ miles in width; it affords anchorage for large vessels, with ample room. Ras Fugu, the south extreme of an island formed by Monabo River, consists of low sand hills.

The south shore, from Ras Kisarahondo, trends southwestward for about 1¾ miles to Pangage Point, and between the latter and Mutaboa Point, 4 miles westward, a bay is formed, receding 2 miles to the southward; the land appears to be low, with numerous villages and extensive coconut plantations.

On the north side, between Ras Fugu and Point Lopo, a bay, 4¼ miles in width and receding 2 miles to the northward, is formed, the shores, which are fairly high, being fringed with mangroves, with, near the middle of its head, Mokambo Hills, 135 feet high, the most conspicuous marks in the vicinity. The Mundomonho, Mualhala, and Mitique Rivers flow into the head of the port through a common entrance about 600 yards in width, between Mutaboa and Lopo Points; the Mundomonho River has a depth of about 3 feet in its entrance at low water.

Dangers.—Shore Bank, under 3 fathoms, extends about ¼ mile off between Ras Kisarahando and Pangage Point, with a reef extending ½ mile westward of the latter, the extreme being Calajulo or William Point, a small coral bank drying at low water; shore bank also extends about ¾ mile off, in places, in the bay on the south side, while from the head of the port it stretches 1½ miles into the port, but it is only ½ mile off in the northern bay.

Three detached shoals are situated in the middle of the port, the outer, in mid-channel of the inner part of the entrance, with a least depth of 3 feet, being about 1.1 miles northwestward of Pangage Point; the other shoals west-southwestward and west-northwestward from the preceding, having 4½ fathoms and 1 fathom, respectively.

The depths in the entrance channel are from 19 to 44 fathoms and in the port from 13 to 25 fathoms, but in some parts they are irregular.

Directions.—Mokambo Hills bearing 270°, lead about ½ mile southward of Peel Bank and the same distance northward of Mudge Reef, and when St. George Island Lighthouse comes in line with Sancoul Point, bearing 62°, steer about 235° to pass 400 yards off Ras Fugu.

If proceeding to the northern part steer midway between Ras Fugu and the 3-foot shoal in mid-channel not bringing Ras Fugu to bear to the southward of 107°, to avoid the shore bank at the head of the northern bay; if entering the southern part steer midway between Calajulo Point and the 3-foot shoal to an anchorage.

Anchorage may be taken up in depths of from 10 to 29 fathoms, clear of the 3-foot shoal, or off Mokambo Point in from 5 to 8 fathoms; in the northern part anchorage may be obtained with Lungo River bearing 0°, and Ras Fugu, 107°.

Tides.—It is high water, full and change, in Port Mokambo at 4 h. 20 m.; springs rise 14 feet.

Villages.—Muchelia (Mochila) is the most important village near the Lunga River, on the north, and Kivolani and Lunga on the south, shore, the latter, near Mutaboa Point, has a garrison.

Supplies of cattle, poultry, fish, vegetables, and water can be obtained at most of the villages.

Mozambique Harbor, formed in the outer part of Mossoril Bay, which inlet extends about 8 miles northwestward of Mozambique Island, is immediately within a line joining Sancoul Point and Ponta Cabecinha, the two points of entrance to the bay.

Sancoul Point has a few huts on it, and between it and Point Quisumbo, 3½ miles north-northwestward, the land is low, with mangroves and sand hills, from 14 to 17 feet high; inland are palms and mango trees.

Northeast side.—Between Cabo Cabeceira and Conducia, the latter about 5 miles to the northward, and to which the coast gradually rises, a coral flat extends from 1 mile to 2¼ miles off, surrounding at its greatest distance from the shore, Tree Island.

Tree Island (Sete Paus), the northernmost and largest of three islands lying on a sand bank, fully 2 miles in length in a north and south direction, and just covered at high water, has a few trees growing on its northeast end; the south extreme of the bank on which these islands stand, is about 1½ miles eastward of Cabo Cabeceira, and about 600 yards within the edge of the coral flat.

Cabo Cabeceira, about ½ mile northeastward of Ponta Cabecinha, is a low, bluff cliff with trees on it, and the northeast shore, between Ponta Cabecinha and Sao Joao, 1¾ miles west-northwestward, forms Cabeceira Pequena, a small bay dry at low water, while northwestward of Sao Joao is Cabeceira Grande, a somewhat similar bay; from this the northeast shore trends westward for 2½ miles to Mapete village.

Dangers—West side.—Sancoul Sands, covering near high water, extend 1¼ miles eastward from the west shore, between Sancoul Point and Point Quisumbo, and eastward of the sands is Mozambique Flat, an extensive coral bank, with depths under 3 fathoms, its southern edge stretching eastward for 4¼ miles from Sancoul Point to San Jago Island; and its eastern edge, trending north-northwestward, for 4 miles to the northeast extreme of Mozambique Island, from which the northern edge takes a westerly direction to Point Quisumbo.

Mozambique Flat has in most places from 7 to 8 feet at low water, spring tides, but the sea generally breaks heavily on its southern edge between Sancoul Point and San Jago Island.

San Jago (Sena) Island, about ½ mile in extent, and wooded, is surrounded by a reef which extends 600 yards from it in places.

Mozambique Island, nearly 1¾ miles in length in a northwest and opposite direction, with a general width of about 400 yards, is low, formed of coral, and occupies the northeast end of Mozambique Bank Flat. Lorenzo Fort is on a rock of the southwest end of Mozambique Island, and is joined to it at low water by a coral flat.

Northeast side.—Harpshell Sands, covering near high water, extend nearly 1 mile south-southwestward of Ponta Cabecinha, and 1¾ miles in the same direction from Cabeceira Pequena, in Harpshell Spits, two pointed tongues of the sands, which show plainly at low water, and may sometimes be traced by the eye at high water; it is stated that with southerly winds these spits extend farther seaward than usual.

Harpshell Sands extend about 1⅔ miles south-southwestward of Cabeceira Grande, and from the western side of that bay join Mapete Sands, which stretch 1¼ miles south-southwestward of Mapete village; these sands, with shore bank under 3 fathoms beyond them, form the northeast side of the entrance to and of Mozambique Harbor, and also the north side of Mossoril Bay.

St. George (Goa) Island, dividing the entrance to Mozambique Harbor into two channels, is about ½ mile in extent, flat, composed of coral and without trees; it is surrounded by a reef except on the northwest side, extending generally from 200 to 400 yards from it, but on the west side, where it is continued by bank with depths under 3 fathoms, it stretches nearly ½ mile off.

Light.—The light structure on St. George Island, somewhat resembling a church with a square, yellow tower, exhibits, at an elevation of 72 feet above high water a white fixed light, visible in clear weather from a distance of 15 miles.

Channels.—The harbor is approached through two channels, of which South Channel is about 1 mile in width, between the dangers extending from San Jago and St. George Islands on either side, while North Channel, between the north side of St. George Island and the coral flat extending 1¾ miles southeastward of Cabo Cabeceira, is about a similar width.

Leading lights.—On Sebastian Fort, at the northeast extreme of Mozambique Island, two fixed green leading lights are exhibited, at elevations of 69 and 49 feet above high water, respectively, from iron framework derricks, the rear framework being surmounted by a black triangle; the lights should be visible in clear weather from a distance of 4 miles, and are in line bearing 283° and 200 yards apart.

Two fixed red leading lights, 3,600 yards apart, and in line bearing 334°, are also shown, the rear from a tower on the south corner of the Government buildings in Cabeceira Grande, at an elevation of 35 feet above high water, should be visible in clear weather from a distance of 5 miles.

The front light, from a red and white turret on Harpshell Sands, is shown at an elevation of 11 feet above high water, and in clear weather should be seen from 4 miles.

A fixed green light is shown from a stone beacon with red and white bands, situated on a small islet one cable southward of Ponta Cabecinha, at an elevation of 19 feet above high water. (For bearings visible, see Light List.)

Signal station.—Vessels can communicate by the International Code with a signal station at Sebastian Fort, and storm signals are made.

Beacon.—A triangular beacon, with white parallel lines, stands on Sebastian Fort, and under it is a broad white stripe on the fort.

Depths.—The depths in the entrance to the South Channel are from 6 to 8 fathoms, but westward of St. George Island a narrow shoal with a least depth of 4 fathoms crosses the channel, forming a bar, within which the water again deepens to 6 and 9 fathoms, and to from 6 to 20 fathoms at the anchorage, eastward of Sebastian Fort.

The depths in the entrance to the north are about the same as those in the South Channel, and a continuation of the same narrow shoal forms a bar within with a depth of 4½ fathoms, after which the depths increase.

Channel dangers.—Three coral knolls, known as A, B, and C, lie in a northeast and opposite direction in the channel westward and northwestward of St. George Island, A with 2½ fathoms and B with 2¼ fathoms being one on each side of the fairway of the South Channel; C, with a least depth of 2¾ fathoms, is on the south side of the fairway of the North Channel. The positions of these knolls are doubtful.

Sebastian Spit nearly surrounds the northeast extreme of Mozambique Island, extending 400 yards from the east end; at low water it is often dry, and is then clearly visible.

Leven Bank, on the northwest side of Mozambique Island, the harbor being formed between the shore bank of the island and the southern edge of the bank, is nearly 1½ miles in length in an east and west direction, with a least depth of 1½ fathoms.

Buoyage.—In the South Channel a red spar buoy (A), surmounted by a triangle, is moored in 5 fathoms about 1,000 yards southwestward of the south end of St. George Island.

In the North Channel a red conical buoy (No. 2), surmounted by a triangle, is moored in 4¾ fathoms, nearly 1½ miles southward of Ponta Cabecinha, off the extreme of the shore bank under 3 fathoms.

Two similar buoys to the preceding, Nos. 3 and 5, mark the southwest edge of the bank off Harpshell Spits; they are moored in 4 and 3½ fathoms, respectively.

A black buoy (No. 1) with a cylindrical topmark, marks the extreme of the shoal water extending northeastward of St. George Island, and a similar buoy is moored on the north edge of C knoll.

Sebastian Spit is marked on its east side by a buoy similar to the preceding (No. 4).

In the harbor, the southern side of Leven Bank is marked at its east end by a red conical buoy (No. 6) in 16 feet water, and farther westward by a red can buoy.

The north side of Leven Bank is marked by a black can buoy (No. 7), with a cylindrical topmark.

Caution.—No reliance should be placed on the position or the extent of any shoal, as both are uncertain, while the buoyage is approximate.

Tug.—A Government tug is available.

Directions.—The land for a distance of 10 miles to the southward, as well as about the same distance to the northward and in the vicinity of the harbor, is low, but St. George Island with its lighthouse, Mozambique Island with Sebastian Fort, flagstaff, and beacon, also the tall white spire of a church westward of it, are conspicuous objects from seaward.

Vessels from the northward should make the land well to the northward of Mozambique, to allow for the current, especially during the northeast monsoon, and a sailing vessel, swept to the southward of that port by it, should immediately stand to the eastward for a distance of 80 miles or perhaps more, to regain the northing outside the influence of the current; frequent observations to obtain the latitude should also be taken.

Pao Mountain, 23 miles northwestward, and Mount Meza (Table Mountain), 19 miles to the northward of Sebastian Fort, are remarkable in clear weather, the former resembling a small round-topped hill surmounting a larger one, but this mountain is not often visible. Mount Meza, 1,095 feet high, appears as a long flat hill, rising from a longer flat-topped ridge, but from a distance only its upper part is seen, when it appears as a flat island.

South Channel.—Coming from the southward it is necessary to guard against the indraft into Mokambo Bay, and Tree Island should be kept open eastward of St. George Island, bearing 0° until the white stripe or the triangular beacon on Sebastian Fort bears 312°, which will lead between A and B shoal patches; when the light tower at Cabeceira Grande is in line with Harpshell Sands Light-beacon 334°, it may be steered for, which will lead to the anchorage eastward of Sebastian Spit.

From the entrance vessels may also use the channel between B and C patches by steering to pass eastward of the black buoy marking the east side of B patch, after passing the red buoy westward of St. George Island, and when between the patches altering course to the leading marks just mentioned.

If intending to enter the harbor, continue on the leading mark, steering 334°, passing between the buoy marking the east end of Sebastian Spit and the red buoy on the edge of Harpshell Spits, and when the customhouse pier, on the north side of Mozambique Island, opens northward of Sebastian Fort bearing about 247°, alter course gradually to the westward and steer about 250° along the south side of Leven Bank to a convenient anchorage.

When between Sebastian Fort and the black and white spar buoy on the east end of Leven Bank, attention is necessary to the helm to make due allowance for the tidal stream, which runs strongly and, with a rising tide, sets toward Leven Bank.

North Channel.—The North Channel should always be used by large vessels, and they should lie at the outer anchorage.

If approaching from the northward, San Jago Island open eastward of St. George Island, bearing 218°, leads eastward of the coral flat extending from Tree Island and Cabo Cabeceira, and if the iron derricks, the rear one surmounted by a black triangle, from which the lights on Sebastian Fort are exhibited, can be distinguished, steer for them in line, bearing 283°, which will lead southward of the red buoy marking the extreme of the shore bank extending southward of Ponta Cabecinha, and between it and the buoy marking C patch, to the anchorage eastward of Sebastian Spit.

By night.—If entering by the South Channel, the rear light (green fixed) on Sebastian Fort should be steered for 312°, passing between A and B patches, and when the leading lights (red fixed) at Cabeceira Grande and on the Harpshell Sands come in line 334°, alter course for them, anchoring eastward of Sebastian Fort, or if proceeding into the harbor, when the customhouse pier lights (green fixed) open, bearing about 247°, keep gradually to the westward, steering about 250° along the south side of Leven Bank.

The fixed green lights on Sebastian Fort in line bearing 283° lead through the North Channel and to the anchorage eastward of Sebastian Spit.

Outer anchorage.—The outer anchorage, which should be used by vessels of deep draft, is in depths of from 7 to 8 fathoms, with flagstaff on Sebastian Fort bearing between 55° and 87°, distant ¾ mile, and a vessel anchored on the former bearing will be out of the strength of the tidal stream, which runs with considerable force through the North Channel and northward of Sebastian Fort. At this anchorage, which has not been closely sounded, several deep holes exist, and care is necessary when anchoring.

Port.—The Port of Mozambique, formed between the northwest side of the northeast end of Mozambique Island and the southeast and south sides of Leven Bank, is about ¾ mile in length and from 300 to 400 yards in width; the customhouse pier extends nearly 200 yards north-northwestward from the island on the south side.

The depths are from 3½ to 5 fathoms in the eastern entrance and from 3½ to 4½ fathoms at the anchorage.

Lights.—Two fixed green lights are shown, at an elevation of 19 feet, from the end of the customhouse pier, and an additional fixed red light on the pier, and a white and a red fixed light on the mast of the harbor office, mark the anchorage.

Inner anchorage.—The eastern limit of the anchorage for vessels of war is a line joining the buoy marking the southeastern end of Leven Bank to the gate of Sebastian Fort; the western limit is a line passing through the eastern light structure on the customhouse pier and the western corner of the tower of S. Paulo Church. Vessels should anchor so as to leave a clear channel for merchant vessels between them and Leven Bank.

By night the last-named limit is indicated by the eastern green light on the pier in line with a red light on the same pier.

Foreign vessels of war anchor eastward of the Portuguese Government vessels, or should there not be space in this anchorage, they should anchor northward of a line joining the eastern buoy of Leven Bank with the inner buoy of Cabeceira Bank.

Merchant vessels anchor westward of the anchorage for vessels of war, the eastern limit being the western limit of that anchorage, and the western limit a line passing through the flagstaff of the harbor office and the flagstaff of the post office.

By night this line is indicated by a light on the staff of the harbor office, showing red to the eastward of the above line, and white to the westward.

Vessels in quarantine anchor westward of a line passing through the eastern corner of the School of Arts and Mount Pao.

Vessels laden with explosives or combustibles and hulks also anchor westward of this line, as directed by the port authorities.

There is also anchorage, for vessels of moderate draft, between the northeast side of Leven Bank and Harpshell Sands.

Tides.—It is high water, full and change, in Mozambique Harbor at 4 h. 15 m.; springs rise 12 feet.

Tidal streams.—The stream of the rising tide sets to the westward and the other stream in an opposite direction; they are so strong at springs as to enable a sailing vessel taking advantage of them to work out against a strong sea breeze.

Town.—Mozambique is the headquarters of the northern Province of Portuguese East Africa, and the island is covered with the stone buildings of the town, which has fairly wide and well-kept streets; the palace of the Governor General is a large building fronted by a wharf; in 1910 the population of the district was 362,634, of which 473 were Europeans, and a British vice consul is resident.

Communication.—Steamers of the British India Co. call monthly when proceeding from Bombay to Durban but not when returning; the vessels of the Empreza Nacionale running monthly from Lisbon, via the cape, usually terminate the voyage at Mozambique, and the Union Castle Line have also a monthly service, outward and homeward bound, via Suez Canal.

The construction of a railway about 342 miles in length, of which 280 miles will be in Mozambique and 62 miles in Portuguese Nyasaland, has been commenced.

Submarine cables connect Mozambique with South Africa, Zanzibar, Beira, and Madagascar, and there are land wires along the coast to the southward to Kiliman and to the northward to Kirondo.

Coal and supplies.—Between 1,000 and 2,000 tons of coal are kept in stock, and about 200 tons could be put on board in 24 hours, unless coaling was impeded by northeast or southwest winds; coaling is carried on by bags, and six lighters, holding each 30 tons, could be hired.

Fresh meat, vegetables, and bread may be procured, but in very limited quantities unless notice is given, and vegetables are very scarce. Fowls, oranges, and some other fruit are plentiful.

A water tank, holding about 6,000 tons, can be obtained from the port captain, and there is also a Government floating tank.

Repairs.—Only small coasting craft are built, and wooden vessels may be repaired chiefly by native workmen.

Hospital.—A good general hospital is maintained in the town, but the medical attendance is said to be insufficient.

Storm signals.—The storm signals, made at Sebastian fort, on information being received by cable from Mojanda in Madagascar, consist of warning signals which are as follows:

By day.—A black cone, pointing upward, at the northern yardarm.

By night.—Three white lights, placed triangularly, on the same mast.

Landing, except at low water, spring tides, can be effected at the wharf fronting the Governor General's palace or at the customhouse pier.

Trade.—The principal exports are mangrove bark, mealies, beans, groundnuts, rubber, and black wood, and the imports are rice, butter, metal goods, lime, cement, provisions, codfish, petroleum, and cotton goods of all descriptions. In 1911 the port was entered by 156 steam vessels, with an aggregate tonnage of 585,076 tons.

Climate.—The climate of Mozambique is unhealthful, fevers, malarious and bilious, being prevalent, against which the best precautions are temperate living and abstinence from alcoholic stimulants; malaria proceeds from the mosquitoes, which frequent the rainwater tanks. The rainy season is from November to March, inclusive.

Current.—A south-going current is usually experienced off Mozambique, its limits extending from near the outer reefs of that place to from 50 to 80 miles from the land, the velocity, which is at its maximum during the strength of the northeast monsoon, and vice versa, varying from 2 to 4 knots. In July and August, during the southern monsoon, the current is inappreciable or close inshore a counter current may be experienced; therefore the prevailing monsoon should always be considered when making an allowance for the current.

Winds.—The prevailing winds on the coast about Mozambique are northerly from October to April and southerly during the rest of the year. Land and sea breezes prevail, the former blowing directly out of the harbor at daylight and the latter coming in about 10 or 11 a. m. from southeast to south, shifting toward east in the afternoon.

Cyclones are experienced occasionally, and at long intervals, but recently they have occurred in three consecutive years, during the month of January, doing considerable damage to vessels, owing to the loosening of the sand by the heave of the sea preventing the anchors from holding; previous to this none had been experienced for 40 years.

Other cyclones happening since have damaged the surrounding country as well as shipping, and lights, leading marks, etc., have been temporarily destroyed. They frequently pass through the Mozambique Channel, within a few miles of the harbor.

Mossoril Bay, a large harbor, within and northwestward of Mozambique Island, is about 2¼ miles in length by 1¼ miles in width, with depths of from 4 to 8 fathoms, and capable of containing a large number of vessels; it has only been partially sounded.

The northwestern part of Mossoril Bay branches off into three creeks, of which the Lombu and Calombo Creeks are the two southernmost, while Mossoril Creek, the northernmost, is only separated from Bahia Conducia by Empassa Isthmus, ½ mile wide; Calombo Creek is the only one of these which is not dry at low water. The shores of all these creeks are covered with mangroves, but there is communication by road between Cabo Cabeceira and Empassa Isthmus.

Buoys.—The following buoys were moored in Mossoril Bay in 1914: Two buoys about ½ mile and 1$\frac{3}{10}$ miles in a west-northwest direction from the northern of the two western prongs of Leven Bank, the nearer buoy being conical red with a spherical topmark and numbered 8, and the other black can, with a similar topmark, and numbered 9. No. 8 Buoy is in 5, and No. 9 Buoy in 4¼ fathoms.

Nearly ½ mile southward of the former buoy is a white can buoy, C, and near the extreme of the narrow prong of Mapete Sands, which extends southeastward, is a red conical buoy, surmounted by a triangle, and numbered 10, but the existence of the extremity of the prong is doubtful. C Buoy is in 3½ and No. 10 Buoy in 4 fathoms.

Bahia Conducia, and the port at its head, are separated from Mozambique Harbor by Cabeceira Peninsula, the entrance to the bay being 6 miles wide between Tree and Kitangonia Islands, with deep water between. The navigable channel to the inner part of the bay is about 1½ miles wide, between Cabo Conducia and Kissangula (Sombrero) Islet, 3 miles apart, from whence it trends about 6 miles westward to Euia or Bar Point.

Coral flats extend about 1 mile off the southern side of the bay and off Kissangula Islet on the northern side, and about half that distance off the shore within the islet. A 3½-fathoms patch lies nearly in mid-channel, and about 2 miles northward of and from 4½ to 9 fathoms at the anchorages within Cabo Conducia.

There are irregular depths in the entrance of from 20 to 4½ fathoms, but becoming more regular toward the head of the bay and decreasing from 11 to 5 fathoms within ½ mile of the northern shore; at the entrance to the port they are from 4½ to 6½ fathoms.

Cabo Conducia is cliffy and about 200 feet high, the coast on either side being low and sandy.

Kitangonia Island, on the northern side of the entrance to Bahia Conducia, is about 1¾ miles in length in a north-northeast and opposite direction, and 1 mile in width, and apparently has no dangers on its seaward side beyond a short distance.

Kissangula, or Sombrero, is a rocky islet with trees 3½ miles westward of Kitangonia Island.

Port.—Rio Conducia (Sinyudi) stretching northward of Euia Point, at the head of the bay, forms at its mouth a landlocked harbor 1 mile long by ½ mile wide; Euia Point is a dry narrow spit of sand with some shrubs on it. Rio Conducia has its source in Mount Meza, and is navigable for boats almost to the foot of the mountain.

Directions.—Approaching from the southward, and having rounded Trees Island at about ½ mile distant, steer for Mount Meza, just open westward of two rocky points, nearly midway between Chicoma and Nifuku, on the northern shore, bearing about 325°, and when Cabo Conducia bears 250° alter course to 300° for the outer anchorage.

If intending to use one of the inner anchorages, and being unable to obtain a pilot, it will be necessary to proceed carefully along the northern shore, and as far as the anchorage about 2 miles eastward of Euia Point, a good stern mark would seem to be the south extreme of Kitangonia Island and Kissangula Islet in line, bearing 72°, steering 253°, but under such conditions it would be prudent to send a boat ahead to sound.

Above the anchorage, just mentioned, the channel is said to be tortuous, but nothing less than 4½ fathoms is charted in the fairway; a shoal is shown close northward of Euia Point.

Coming from the northward, and having made the land in that direction to allow for a probable south-going current, steer along the land at a convenient distance, rounding the south extreme of Kitangonia Island at about ¾ mile distant, and steer for Cabo Conducia until Mount Meza is open westward of the two rocky points, when proceed as before directed.

Anchorage.—There is anchorage in the entrance, in from 6 to 9 fathoms water, over irregular bottom, with Cabo Conducia bearing 165°, and Kissangula Islet 63°, and also farther up the bay, in a depth of 5 fathoms over mud, with the same islet bearing 72°, and Cabo Conducia 108°.

Tides.—It is high water, full and change, at Porto Conducia, at 4 h. 15 m.; springs rise 12 feet.

Supplies.—Fowls, eggs, and oysters may be obtained from the natives. Near Euia Point there are salt works from whence salt is shipped to various places.

Porto Velhaco, within the point of that name, is protected to the southward by Kitangonia Island and, for coasting craft, appears to afford better shelter than Bahia Conducia from the strong northwest winds so common toward the latter end of the northeast monsoon.

The port has not been surveyed, but depths of 3 or 4 fathoms are shown in the entrance and from 1 to 2 fathoms inside; it is reported to be full of sunken rocks and unsuitable as an anchorage. The sea almost always breaks very heavily near Ponta Velhaco.

Coast.—**Kroosi Peninsula** is 3¾ miles northward of Ponta Velhaco, and on its north side is a bay in which coasting vessels find perfect shelter lying aground on the sand within the outlying reef, which must be crossed at high water abreast of Kroosi village on the west side of the bay. From the north point of Kroosi Bay the coast takes a northerly direction for about 13 miles to Gwazi Point, on the south side of the entrance to Kisima-julu Harbor, and is backed by ranges of hills about 2 miles inland. Janga village, on the point of the same name, lies about midway.

Kisima-julu Harbor extends about 2 miles west-northwestward and then turns southwestward for a somewhat similar distance, its entrance channel between the reefs being about 200 yards in width, with depths of from 3 to 4 fathoms.

In the harbor, which is about 1 mile wide, the depths are from 4 to 8 fathoms but it has not been surveyed, so caution is necessary when entering; it is used by coasting vessels engaged in the timber trade. A reef is charted as extending nearly 1 mile southward of the northern point of entrance.

Coast.—From Kisima-julu Harbor the coast trending north-northwestward for about 5 miles to Cabo Melamo, the southern point of entrance to Bahia de Fernando Veloso, is about 300 feet high and fronted by a high, sandy beach as far as Ponta Relambazo, a conspicuous white sandy projection, marked by casuarina trees. Cabo Melamo (Ras Kulumlomu), low and rocky, is 2 miles from this point but is reported to lie 1½ miles farther westward than charted.

Bahia de Fernando Veloso (Mazazima), from its entrance, about 6 miles in width, between Capes Melamo and Mocuo, extends about 8 miles southwestward, having in its southwest corner Port Nakala, extending about 5½ miles to the southward, and in the northeast corner Belmore Harbor, stretching about the same distance to the northward. Nifiku Nikulu Point, 2¾ miles westward of Cabo Melamo, has a projecting rock, with two or three casuarina trees on either side of it, rendering it conspicuous.

From the south shore, trending about 8 miles west-southwestward to Nahareni Point, a ledge, drying in places at low water, extends about ½ mile, with depths of from 7 to 8 fathoms outside it a short distance.

On the north side the shore trends southwestward for about 4 miles between Cape Mocuo and Tugo Point, and within the former cape is a hill about 300 feet high, rising abruptly from the level land around, and having a somewhat flat top which seen from the northward from a distance of about 15 miles, resembles a vessel under sail, but loses that appearance when closed or on a different bearing.

The land at the head is moderately high, with some hummocky hills, while northwestward are some remarkable saddle-shaped hills and a sugar-loaf peak. The depths in mid-channel of the bay are over 100 fathoms.

Anchorage in a depth of about 8 fathoms may be obtained at from 4 to 6 miles westward of Cabo Melamo, and 1 mile or less off the southern shore, also near Nahareni Point, on a bank of coral and sand, with depths of from 8 to 12 fathoms, but this bank deepens suddenly to 80 fathoms from its northern edge.

Tides.—It is high water, full and change, at Bahia de Fernando Veloso at 4 h. 15 m.; springs rise 18 feet.

Supplies.—Fowls, ducks, goats, and vegetables can be procured, also guinea fowls, venison, and a species of hare. Water can be obtained from a small stream on the southern shore, about 1 mile eastward of Nahareni Point, but watering with a vessel's boats is difficult.

Port Nakala, in the southwest corner of the bay, and entered between Nahareni and Sakamata Points, ½ mile apart in a northeast and opposite direction, extends for nearly 6 miles in a south-southwest direction. Nahareni Point, the northeast point of entrance, has on it the remains of a fortress, and on the summit of a low hill southeastward of it, is a military post, which is a two-storied house with a red roof and a flagstaff.

The eastern shore rises in steep but well-wooded slopes to 100 or 150 feet, with bold promontories open to the prevailing sea breezes, and having on mangrove swamps near, so that they would be suitable for settlements.

Within Sakamata Point, on the west side, is Namelala Bay, extending 1¾ miles westward, with a width of about 1 mile, and having an entrance little more than 200 yards in width. Between Kera Point, on the south side of the entrance, and Namuhashi Point, 2¼ miles south-southwestward, is Mwanamkulo Bay, the north shore of which, from Kera Point, having a drying bank with some rocks on it, extending from 200 to 400 yards off; a similar, but broader bank borders the southern shore of the bay, and surrounds Namuhashi Point, and two detached patches lie nearly in the center of the bay.

Beacons.—Two white triangular beacons are situated on the shore about ¼ mile southeastward of Nahareni Point.

Dangers.—Except at one or two points, where shoals extend for less than 200 yards, the eastern side is clear of dangers, but on the west side a shoal extends about 300 yards from Sakamata Point, and one cable from Kera Point, while off Namuhashi Point are Gaivotas (Shihubidi) Rocks, awash at high water, neap tides, and lying on a shoal extending about ½ mile east-northeastward of that point.

In Bengo Bay, southward of Namuhashi Point, shoal water extends nearly ¾ mile from the head of the port, which terminates in two creeks.

The depths in the entrance are from 14 to 58 fathoms, shoaling to 15 fathoms abreast of Namuhashi Point, and to from 5 to 9 fathoms in the southern portion of Bengo Bay; in Namelala Bay there are from 3¼ to 10 fathoms, and 20 fathoms in the entrance.

Anchorage.—Good anchorage may be obtained everywhere within the port, but the best anchorage is said to be in the small bay to the southward of Nahareni Point, abreast the landing place for the military station. A good berth is said to be in about 12 fathoms, over sand and mud, with the outermost tree on Nahareni Point in line with a group of black rocks on the beach, just within the point, and with the broad slope of Mount Luguno bearing 320°, and with the two white triangular beacons in line 50°.

Tidal streams.—The tidal streams run strongly in the entrance to and at the anchorage off the military station, but not at the anchorage within the port.

Telegraph cable.—A cable crosses the entrance from ½ mile southward of Nahareni Point to Sakamata Point, communicating with the military post.

Belmore (Nihegehe) Harbor, in the northwest corner of Bahia de Fernando Veloso, is about 4 miles in length in a north-northwest direction, and 1 mile in width throughout, the entrance, about ¾ mile in width, being reduced to 600 yards by reefs extending from each entrance point.

The eastern shore is mostly rocky, with sandy patches for about 2½ miles, and then becomes a mangrove swamp to the head, while the western shore, is also a mangrove swamp, with the exception of a sandy bight, just within the entrance.

The entrance has no bottom at 20 fathoms, and within there are from 8 to 10 fathoms on each side near the shore, and 13 to 20 fathoms off Utuku, a cove on the east side, from which the depths decrease gradually to 7 and 8 fathoms off West Cove.

Beacons.—Two triangular marks affixed to two bare trees on the sands near Utuku, lead to the anchorage off that place.

Anchorage may be obtained in about 15 fathoms off the military post at Utuku, with the beacons in line, or in 7 fathoms off West Cove, nearly ½ mile from the western shore. The tidal streams run strongly in the entrance, and in the rainy season the reefs are difficult to distinguish on account of the discoloration of the water.

Supplies of fowls and vegetables might be obtained at a village on the eastern shore, and the sandy bight on the western shore is a good place for seining.

Coast.—The coast between Cape Mocuo and Cabo Loguno is little known, owing to Baixo de Pinda fronting it. The coast has some headlands, and on the beach are trees of apparently equal height, while there are a few sand patches and some red soil; the peaks of the Loguno Range are visible for about 20 miles.

From Cape Mocuo, which has Gomen Islet about 100 yards in length and 13 feet in height, connected to it by shallow water, the coast trends to the eastward of north for about 4 miles, to Ponta Pinda, and then turns north-northwestward for 6 miles to Cabo Loguno; there are the remains of an old fort on Gomen Islet.

Baixo de Pinda, fronting the coast and extending 5 miles from it, dries at low water, spring tides, at which time it exposes wreckage, some having the appearance of large rocks; the shoal commences to the northward of Gomen Islet, outside which there is a depth of 12 fathoms at ¾ mile distance, and gradually increases its distance from the shore. The water is emerald green, and the outer edge of the shoal being generally rocky and steep-to, renders it dangerous; there are breakers off the edge in places.

Cabo Loguno (Ras Mwamba-koma), the southern point of entrance to Memba Bay, is about 80 feet high near the sea, level topped, and has perpendicular cliffs; it appears to be steep-to on its northern side, and on its east side is Baixo de Pinda.

Beacon.—A white beacon, consisting of a triangular pyramid, surmounted by a mast carrying two triangles, is erected on the cape for surveying purposes.

Current.—The south-going current in this vicinity is very strong, attaining a velocity of 5 knots, and setting toward Baixo de Pinda, so that vessels bound up or down the coast should not go to the westward of the meridian of Ponta Relambazo.

Memba Bay (Mwendazi), about 6 miles in width at its entrance between Capes Loguno and Tapamanda (Ras Umlulu), recedes about 15 miles westward from the former, its south coast being indented by Bocage Harbor and Porto Duarte Pedroso; the north coast is moderately high, with mangroves growing along the beach, which is fringed by sand and coral banks, one of the latter extending 1½ miles southward from a position about 1 mile southwestward of Cape Tapamanda.

Bocage Harbor, an inlet extending about 3 miles in a southerly direction, although said to be a convenient anchorage, no bottom at 60 fathoms could be obtained near its entrance.

Porto Duarte Pedroso, about 3 miles westward of Bocage Harbor, is about 1,800 yards in width between the points of entrance, but the navigable channel is reduced to 800 yards by reefs with rocks above water on them extending ¼ mile from each side; immediately within the entrance, a point projecting to the northward, divides the port into two bays, the eastern having sand banks extending from either shore, and particularly from the western side.

The eastern bay has depths of from 12 to 14 fathoms at its entrance, and a considerable anchorage space with from 4 to 6 fathoms, while the western bay, with from 11 to 12 fathoms at the entrance, has from 4 to 7 fathoms within.

Directions.—The port is easy of access, as the reefs on either side can usually be seen, and a mid-channel course between them should be kept, until about 400 yards from the point separating the bays, when course may be altered into the one selected. A conspicuous tree, standing on the dividing point, kept midway between two sharp hills inland, in a southerly direction, forms a good mark for the entrance to the port.

Mto Kkubure (Tembo), discharging into the northwest corner of Memba Bay, has such a considerable volume of water during the rainy season, as to discolor the bay and sea for some distance, but in the other season its mouth is almost dry at low water; only very small craft can enter the river. A Bezirk military station stands on slightly rising ground on the right bank, in the center of a large village, the straw huts of which being distinguishable from the entrance to Memba Bay, affords a good mark for vessels intending to anchor off the river.

Beacons.—Two white beacons, each consisting of a post with a triangular shape, stand on the west shore of the bay as a guide for anchoring.

Anchorage may be obtained in a depth of 22 fathoms, with the beacons in line, bearing 290°, but in the rainy season care must be taken to guard against the strong out-going stream from the Mto Mkubure.

Communication.—There is telegraphic communication with the coast ports. Corn and linseed are exported, and the country abounds with big game.

Reef.—A reef, the extent of which has not been determined, extends for about 1¼ miles in a southerly direction from the northern shore and 1 mile southwestward of Cape Tapamanda; it is said to rise suddenly from a depth of 60 fathoms to that of 2½ fathoms, and when coming from the northward it may be distinguished by discoloration and surf, extending for some distance from the shore when there is any swell. The reef is apparently awash at low water.

Coast.—From Cape Tapamanda, which is flat and low, to Sorisa Point, a distance of about 37 miles, the aspect of the land is more striking than on other parts of the coast, being low near the sea and increasing to mostly level land about 200 feet high a short distance within.

The Sorisa Range, several craggy peaks, having the appearance of the ruins of some great city, rise abruptly from this level land to heights of from 2,000 to 3,000 feet, the peaks assuming every variety of form of sugar-loaf, cone, and round or square-topped pillars, in some cases seeming to overhang their bases. Mount Pillar, the highest and most remarkable of these, is a cone with a pyramidal-formed point, always appearing the same from all bearings.

Cape Marenji, 108 feet high, and situated about 3 miles northward of Cape Tapamanda, is steep and formed of reddish-colored rock, with some detached clumps of trees on its summit forming a good mark; the bay formed between the two capes, has Marenji village, which has a good coasting trade, near its head, but it is stated that no river flows into the bay, as shown.

Tembo (Tego) Island, lying about ½ mile off the coast to the northward of Cape Marenji, is a small coral island, overgrown with grass, shrub, and mangroves, rising to a height of about 23 feet.

Sangone (Samuko) Bay, 7 miles northward of Tembo Island, is entered between Samuko and Sangone Points, where it has a clear navigable width of about ½ mile; it extends westward for about 1 mile, and is sufficiently deep to afford anchorage for several large vessels.

Samuko Point may be known by a conspicuous cluster of baobab trees on it, and a Bezirk military station on rising ground, while Sangone Point is a rock appearing as a vessel's stern, standing out conspicuously from the low land; the point is surrounded by a reef.

Directions.—The bay should be entered on a course about 260°, passing about 200 yards from the rocks extending from Sangone Point, and either anchoring rather close to the north shore of the bay or in its center; dhows anchor near the head.

Village.—Samuko village, extending for about 2 miles along the north shore of the bay, is the center for Bezirk commerce; rivers flow into the northwest and southwest corners of the bay.

Coast.—Chionda Point (Cabo Maria Luiza) is about 16 miles to the northward of Sangone Point, and for the first 5 miles the coast is fringed by a reef extending off 1 mile in places.

Bahia Almeida, entered between Chiondi and Sorisa Points, 9 miles apart, affords anchorage in its northern part, protected, at low water, by reefs extending southward from the latter point. Chionda Point (Cabo Maria Luiza), the southern point of entrance, has a reef of stones and bowlders which dries at low water and shows by breakers; it is reported to extend about 1 mile farther to the northward than charted.

About 2 miles northwestward of Chionda Point is the mouth of the Mto Minsangegy, with a small channel over its bar at high water; southward of the river is a conspicuous bluff, forming a good mark, and northward of it is a military station with a large village.

Dangers.—Indujo Reef, about ¾ mile in extent, and awash at low water, lies 3⅓ miles north-northeastward of Chionda Point.

Mancabale Reef, extending fully 5 miles southward of Sorisa Point, dries at low water, spring tides, and at this time, from about January to July, numbers of turtle may be caught on it; there is a depth of 14 fathoms about ½ mile eastward of the reef.

Depths.—There are depths of from 9 to 12 fathoms in the channel southward of Indujo Reef gradually decreasing to the 3-fathom contour line, which is about ¾ mile from the head; the channel between Indujo and Mancabale Reefs has 11 fathoms water.

Directions.—The main entrance to Bahia Almeida is southward of Indujo Reef, and anchorage can be taken up in a depth of 5 fathoms off the mouth of the Mto Minsangegy, with the flagstaff of the military station bearing 270° and Mount Pillar in line with the mouth of that river, 243°.

If intending to anchor at the head of the bay, steer to the northward, keeping about 1 mile off its west shore, and anchor as convenient, at the head, over a bottom of sand and coral.

Tides.—It is high water, full and change, in Bahia Almeida at 4 h. 10 m.; springs rise 15 feet; neaps rise 12 feet.

Lurio Bay, between Sorisa and Pando Points, a distance of about 8 miles, affords sheltered anchorage during the southern, but none during the northern monsoon; the land is all low near the sea, with thick jungle, but there are high craggy peaks in the interior.

Sorisa Point has a conspicuous group of trees behind it, which, showing against the higher background, appears like an island, and on slightly rising ground on the north bank of the Lurio River are some whitewashed houses that may be seen from a distance of 15 miles; at the back of Pando Point a hill with conspicuous white sandy patches also forms a good mark. Lurio River is fronted by a bar which only small craft can cross.

The depths in the bay are from 5 to 15 fathoms.

Anchorage may be obtained in a depth of 5 fathoms, over sand and clay, 1 mile off the mouth of the Lurio River, which flows into the southwestern part of the bay, sometimes discoloring the sea by its waters for some miles. When entering the bay Sorisa Point should be given a berth of at least 1 mile, and the southern portion of the bay should be avoided.

Settlement.—Lurio, a settlement and military station, is said to be the principal place between Mozambique and Ibo; it is connected with Bahia Almeida by a good road.

Coast.—Northward of Lurio Bay the land is of moderate height and continues so from Badgely Point to Maunhane Point, a distance of about 25 miles. This coast is fronted in places by a quicksand beach, and a reef, mostly steep-to, which extends off the northern portion about 1½ miles.

Mkufi.—The bar of the river and port of Mkufi, 5 miles northward of Pando Point, may be crossed at half tide by craft drawing from 5 to 6 feet of water. Close under the southern shore there is anchorage for such craft in from 2 to 3 fathoms. The village is clean and healthily situated on high ground on the right bank; provisions and good water are obtainable.

Ushanga village, about 15 miles farther north, has low land near it, with trees almost to the water's edge; abreast of it is Xanga Mrebwi, a gap in the reef with a deep-water channel.

Northward of Ushanga there is temporary anchorage in about 11 fathoms of water, the holding ground, sand over coral, not being good.

Maunhane Point is rather bluff, but terminates in a low rocky point, with a reef extending 1,600 yards eastward, on which the sea breaks, and showing from disclored water.

Light.—From a white masonry column 48 feet high, attached to a wooden house, is exhibited, 48 feet above high water, a fixed white light visible 12 miles over an arc of 230° from 125° to 355°.

Imbo Bank, with 9 or 10 fathoms water, lies about 2½ miles north-northeastward of Maunhane Point, and westward of it and from ¾ to ½ mile northward of Maunhane Point and the coast westward of it are patches of from 7 to 8 fathoms, with perhaps less water.

Pomba (Mwambi or Pemba) Bay, entered about 4 miles westward of Maunhane Point between Herbert and North Points, nearly 1¼ miles apart, expands within to a basin, forming one of the finest harbors on this coast, being about 9 miles in length in a north and south direction and 5 miles in width, with sufficient water in most parts for deep-draft vessels and shelter from all winds. The country around consists of fertile plain and woods.

Herbert (Miranembo) Point, the southern point of entrance, is low, but has a high hill within it; the point may be approached to a distance of ¼ mile. Discolored water extends about 400 yards of the coast between Herbert Point and Mpira Point, which latter is 1½ miles southwestward, and steep-to, there being about 5 fathoms at a few yards from the shore all around it, but the coast reef appears to extend farther seaward than charted between the two points.

North (Sid-Ali) Point, a moderately high bluff, is covered with trees and jungle and has a conspicuous white lighthouse with a red roof on it; the point is steep-to, there being a depth of 18 fathoms within 100 yards. Mwambi Peak, northward of the point, is low and inconspicuous.

Light.—From a red iron tower, 45 feet in height, on a white masonry base is exhibited, at an elevation of 51 feet above water, a fixed white light, visible in clear weather from a distance of 10 miles, but is shown only when vessels are expected.

Outer anchorage.—Good anchorage may be obtained on Imbo Bank, with North Point bearing 272°, distant 5½ miles.

Dangers.—The shores of Pomba Bay have several rocky ledges, especially on the west and southwest sides, which extend 1½ miles in places, and also a number of shoal coral patches and reefs, chiefly in the western half of the bay, only the principal being mentioned here, as the others will be best seen on the plan. The bay being very imperfectly surveyed, the correct positions of known and named shoals are extremely doubtful, while others may and do exist, so that great caution is therefore necessary in selecting an anchorage, except in the southern arm of the bay.

Mutine Patch, about 2 miles within the middle of the entrance, has less than 1 fathom, and Penguin Shoal, with a depth of 4 fathoms, is situated about ½ mile southward of it.

Pantaloon Shoal, with a depth of 5 fathoms, is situated in the middle of the northern bight of the bay, while in the southern bight a rocky patch, about ⅓ mile in extent, lies about 2 miles west-southwestward of Mpira Point.

Buoy.—Mutine Patch is marked on its north side by a white conical buoy.

Porto Amelia, about ½ mile southeastward of Mpira Point and on the north side of the southern portion of Pomba Bay, which is fully 3 miles in extent, has a small stone pier with a T head.

Lights.—A red light is shown from the southeast and a fixed green light from the northwest end of the pier. A red fixed light is shown from Mpira Point.

Lightbuoy.—A black lightbuoy, exhibiting a red fixed light, is moored on the outer edge of a shoal extending off a point midway between Mpira Point and the pier.

Depths.—The depths in the entrance to the bay are from 25 to 35 fathoms and from 7 to 15 fathoms in the northern bight, while in the southern bight they are from 11 to 16 fathoms.

Directions.—If intending to anchor off Porto Amelia the coast between Herbert and Mpira Point should have a berth of 600 or 800 yards to avoid the shore reef said to extend farther off than charted, and having given Mpira Point a berth of 400 yards when rounding it, anchor in about 14 fathoms 500 yards from the pier, or closer in if required. There is also anchorage in the southern bight of the bay, in from 11 to 16 fathoms water, about 1½ miles southwestward of Mpira Point.

If proceeding to the anchorage in the northern bight of the bay, the chart, lead, and lookout must be the guides, bearing in mind the unreliability of the chart.

Tides.—It is high water, full and change, in Pomba Bay at 4 h. 15 m.; springs rise 15 feet; neaps rise 11 feet.

Winds, etc.—The land wind generally blows out of the bay until 7 or 8 a. m., and the climate is said to be good in comparison to other places on this coast.

Town.—The town, situated on an eminence about 295 feet high, southeastward of Mpira Point, is the headquarters of the district, and contains the Government house and official buildings, as well as a barracks. A British vice consul is resident. Nyamazezi and Mwambi are villages on the west shore of the bay.

Communication.—Steam vessels of the Empreza Naçional de Navegação call fortnightly, and those of the Union Castle Line monthly, the former outward and homeward bound via the Suez Canal. Porto Amelia is connected with Mozambique by a land wire and also with Palma and Kirondo to the northward.

Supplies.—Small bullocks, poultry, and vegetables may be procured; deer and other game is found in the neighborhood, and there is good fishing with the seine. Water is very scarce and either obtained by distillation or from rainfall; two inconsiderable streams are situated in the northeast part of the bay, and in the Nihegi, a larger stream in the southern part of the bay, it is possible ships' boats might obtain a supply. Wood is obtainable.

Hospital.—A hospital is maintained in the town, but the building is said to be quite unsuitable for the purpose.

Trade.—The exports, chiefly consisting of groundnuts, calumba, sesamum, mandioca, millet, and mealies, in 1912 were valued at $440,703, and the imports of manufactured goods, provisions, etc., at $584,596. In 1913 the port was entered by 108 vessels of an aggregate tonnage of 386,134 tons.

Climate.—During the northern monsoon, from the middle of October to the middle of March, the weather is hot, damp, and somewhat oppressive, but the temperature is seldom over 95° F., and generally ranges between 82° and 92°; rain falls intermittently throughout this monsoon, the average rainfall on the coast for the season being about 35 inches. In the opposite monsoon, from April to September, the weather is cool and pleasant, and practically no rain falls.

Coast.—The moderately high coast from North Point trends northeastward for 14 miles to Lurio Point, and nearly mid-distance are Taro and Sanecane Rivers, both small; Lurio Point is on the south side of the entrance to Dedema Bay, which has only a depth of 3 feet, and is scattered over with rocks within, Mto Mugarumo running into its northeast corner.

The coast turning to the northward from Lurio Point becomes low and thickly wooded, for 8 miles as far as Kizeeva Island, two indentations being formed between, of which Bahia Kipao, the southern, extending 2½ miles northwestward, is nearly filled with drying reef and shoal water.

Kipao Island lies on the extreme of the reef on the north side of the entrance, and a drying reef extends from Sito Point, on the south side of the entrance, with a 3-fathom shoal nearly 1 mile eastward of the point, the channel to the anchorage, in from 3 to 5 fathoms, being nearer the island.

Kizeeva Island is low, uninhabited, and has the ruins of a settlement on its west, and two conspicuous trees on its south end.

Porto Arimba, on the northern side of Arimba Head, and protected by Kizeeva Island and reef, has depths of from 5 to 3 fathoms in the channel, between Arimba Head and the island, leading to the anchorage; Porto Arimba, with a depth of 4 fathoms, appears to be a secure harbor for small vessels. It is a Portuguese settlement, with about 400 inhabitants, who rear cattle, and export grain, vegetables, fruit, and timber.

Kerimba Islands—General remarks.—The Kerimba chain of islands, of which Kizeeva, just mentioned, is the southernmost, form an archipelago extending from Arimba Head to Cape Delgado, a distance of 117 miles. In this space, the outer reefs and islands extend in some places as much as 13 miles from the mainland, and in most parts more than 10 miles; but southward of Mahato Island they nowhere extend beyond 8 miles.

The islands, generally low, well wooded and easily seen from seaward, have, in some cases, a diversified surface of hill and dale, whilst many are mere coral islets, and the 18 or 19 openings, between the outer islands and reefs, lead into a still greater number of secure ports or convenient anchorages for small craft.

The mainland abreast of the Kerimba Islands is also generally low, and rarely to be seen when coasting outside the reefs, and this, with the fact that the sea faces of the reefs are steep-to, necessitates caution in approaching this part of the coast, even in the daytime.

Fumo Island, about 6 miles northward of Arimba Head, is connected with Kizeeva by a coral reef; the passage between it and the mainland is only a boat channel. Fumo has a Portuguese settlement, and a population of about 100.

Penguin (Kilaluia) Island, nearly 2 miles northward of Fumo, is a small, wooded, and fronted by a reef ½ mile wide, with a temporary anchorage off Penguin Reef, in a depth of 13 fathoms, over coral, about 1,600 yards southeastward of the south point of the island. Samukan Island Reef, a short distance to the northeastward, is steep-to.

Montepes Bay, contained between Fumo Island and Kisanga Point, 7½ miles to the northward, has only been partially examined, but there is apparently a deep-water channel between the reefs of Fumo and Penguin Islands, although a rock lies nearly midway with a depth of 33 fathoms close to it. At the head of the bay, and at the mouth of the Montepes River, which is said to have a course of about 250 miles, is the settlement of Montepes, consisting of miserable huts, with a population of about 600.

Kerimba Island, about 3 miles long in a north and south direction, and 1½ miles wide, is low, wooded, has a sandy beach, and is the most fertile island of the archipelago; ruins of a Portuguese town are on the island, which now has a nomadic population of about 200. The well water is good.

Kisánga Point, the outer extreme of a fertile peninsula, 4 miles in length in an easterly direction, and bordered by mangroves, has a drying sand bank extending ½ mile from it into the channel between it and Ibo Island, which is scarcely navigable for canoes at low water; Kisanga, a settlement and the capital of the district, has about 2,000 inhabitants and is westward of the point.

Ibo Harbor.—Ibo Island, about 4 miles in extent and nearly divided into two by an inlet cutting into its northwest side, may be distinguished from other islands of this chain by a white fort, which, when bearing about 215°, shows a long frontage; Ibo Bluff, the northeast extreme of the island, of moderate height, with its lighthouse and dark green mangroves, also coconut palms in the town, may be seen from some distance.

Light.—On Ibo Bluff is a white square tower, 20 feet in height, with a flagstaff, and from the former is exhibited, at an elevation of 59 feet above high water, a fixed white light, which in clear weather should be visible from a distance of 13 miles. For bearings of arc of visibility, see Light List.

Mujaca Shoal.—The island, except on its southwest side, is surrounded by a drying bank with rocks on it, and that part of it projecting in two points, and extending 1¾ miles northward of the north side of the northeast portion of the island, is named Mujaca Shoal.

Corea de Sao Gonsalo.—Matemo Island is nearly 5¼ miles to the northward of Ibo Island, and in the channel between the drying banks extending from each is Corea de Sao Gonsalo, a sand bank 2½ miles in length in a northeast and opposite direction, drying at low water and showing by breakers or discoloration when covered.

Depths.—The channel between Mujaca Shoal and Corea de Sao Gonsalo has depths of from 6 to 8 fathoms and that northward of the latter danger from 7 to 25 fathoms; at the anchorage there is from 5 to 11 fathoms.

Buoys.—The north extreme of the eastern of the two points of Mujaca Shoal is marked by a black and red truncated-conical buoy surmounted by a sphere.

A red truncated-conical buoy surmounted by a sphere marks the south edge of Corea de Sao Gonsalo.

No dependence should be placed on finding the buoys in position.

Discolored water has been reported to extend from abreast Manoel da Silva Island for 3 miles in an easterly direction.

Pilots.—Pilotage is compulsory for merchant vessels.

Directions.—The channel between Mujaca Shoal and Corea de Sao Gonsalo is that usually taken, and when entering it a lookout should be kept for the discolored water on the north side of the approach, which should be avoided.

The channel between the buoys being 1 mile in width, if they are in position no difficulty should be experienced, otherwise it is as well to be guided by the eye, as the dangers, and particularly Corea de Sao Gonsalo, show distinctly after half tide, and borrowing on this latter danger will avoid Mujaca Shoal.

Anchorage in from 5 to 6 fathoms water may be obtained with Sao Joao Fort bearing between 165° and 176°, distant 2½ miles, but the holding ground is not good; it is exposed to easterly winds and the tidal streams run strongly, and these are stronger farther to the northward, where deeper water will be found.

Inner harbor.—The inlet cutting into the northwest side of the island for a distance of nearly 3½ miles forms a harbor for small craft, its eastern side being for the first 1½ miles Mujaca Shoal, the western side being formed by another tongue of drying bank; it is fronted by a bar.

Beacons and buoy.—A beacon, surmounted by a ball, marks the extreme of the tongue of drying bank on the west side of the entrance.

A small beacon, surmounted by a triangle, is on the southwest edge of Mujaca Shoal abreast the town.

A small black can buoy is moored on the edge of the western bank, nearly 1 mile within the outer beacon.

Depths.—The bar has depths of from 4 to 5 feet, and the channel within it from 1¼ to 2 fathoms, these latter depths continuing for about ½ mile beyond the town, but the head of the inlet is very shallow; vessels of 7 or 8 feet draft can cross the bar at any time after half tide and lie afloat at low water off the town.

Tides.—It is high water, full and change, at Ibo Harbor at 4h. 15m.; springs rise 11 feet.

Tidal streams.—The tidal streams run strongly in the channel between Mujaca Shoal and Corea de Sao Gonsalo, the stream of the rising tide inclining toward the latter and that of the falling tide toward the former.

Town.—The town, with Fort Sao Joao, is situated on the western side of the northeast portion of the island; the former, consisting of some stone houses and huts, has a population of between 3,000 and

4,000, composed of Portuguese, Arabs, Banians, and natives; the stone fort of Sao Joao is in the form of a star, and there are two other forts.

Communication.—Portuguese coasting steamers call fortnightly.

Supplies of fresh provisions can be obtained in small quantities, but water is indifferent in quality and difficult to procure.

Trade.—The chief exports are oil seeds, rubber, ivory, and wax, and the imports guns, powder, beads, cloth, etc.

Climate.—The unhealthful season is from the middle of January to the middle of March, during which period there is a considerable rainfall, accompanied by thunder and lightning, and at this time fevers are often fatal, Negroes not being exempt from them.

Coast.—From abreast Ibo Island, the coast for 10 miles to Kirinuzi Point, is moderately high, with a range of hills inland which may be seen from a distance of 20 miles, its southern end being bluff, with a conical hill just to the southward. Mto Cramacoma, abreast of Ibo outer anchorage, has a Portuguese settlement with a population of about 600 at its mouth.

From Kirinuzi Point to Pangane Point the coast is higher, but northward of that, to Cape Delgado, the mainland is seldom seen from outside the islands.

Matemo Island, abreast of Kirinuzi Point, is 4½ miles long and 2½ miles broad, and surrounded by a reef that dries at low water; it has Manoel da Silva Islet lying on its southeast part. The island, which is not fertile, is low, with straggling trees along its whole length, and has a sandy beach on its southeast side; the population is about 100, and water is scare.

Das Rolas, a small uninhabited island, about 2½ miles to the northward of Matemo Island, is low, covered with brushwood, and has a reef extending 1 mile northeastward and ½ mile southeastward of it; the northwest point is sandy and affords the best landing.

Anchorages.—Matemo Island affords convenient anchorage near it, sheltered from either monsoon and easy of access, but the tidal streams are strong. Between Envie Shoal, which fronts the coast of the mainland to a distance of 4 miles, and Matemo Island, there is a channel ½ mile wide with depths of from 3 to 5 fathoms. There is also sheltered anchorage ½ mile southwestward of Das Rolas, in from 7 to 9 fathoms water; a land breeze generally blows in the morning.

In running for the anchorage of Das Rolas steer 272° for the south point of that islet, until about 1 mile from it, when alter course to 216°, and the water will gradually shoal to about 4 fathoms when in line between the northeastern points of Das Rolas and Matemo, after passing which line the water gradually deepens again to 8 and 9 fathoms.

A distant peak bearing 242° leads between the reefs extending from Matemo Island and Das Rolas, and when Sangane Point is well open westward of Das Rolas, anchorage may be taken up in 7 or 8 fathoms, with the south extreme of Das Rolas bearing 21° and the northeast extreme of Matemo 118°.

Supplies.—Cattle might be procured from Kirinuzi River, and wood can be obtained from Das Rolas.

Sangane Point, low, white, and sandy, has a reef extending nearly 2 miles off it, and between 4 and 6½ miles eastward is Sangane Reef, 3½ miles in length in a northeast and opposite direction, drying at low water.

Pangane Point, nearly 6 miles northward of Sangane Point, with Molandulo and Kifula Islets, lying off the coast between, is low, sandy, and has a reef, in the middle of which is the small island of Inhate, extending 1½ miles from it and nearly joining the southwestern end of Mahato Island Reef, the channel between, only suitable for small craft, having a depth of 1 fathom. A Portuguese settlement at Pangane Point has a population of about 300.

Mahato Island, about 2 miles eastward of Pangane Point, is surrounded by an extensive reef, except on its western side, where there is smooth anchorage for small craft.

Pantaloon Reef, a coral bank about 4 miles northward of Mahato Island, is 1 mile in extent in an east and west direction, with a least depth of 2¾ fathoms. There is good anchorage on its northern side.

A sand bank awash at high water, springs, but generally visible, lies about 1½ miles west-southwestward of Pantaloon Reef, and is steep-to on its western side, but a coral reef, with from 6 to 8 feet water, extends 1,400 to 1,600 yards from the bank in all other directions.

A 1-fathom patch lies about 3½ miles west-northwestward of Pantaloon Reef.

Ras Pekawi.—The coast between Pangane Point and Ras Pekawi forms a bight receding about 2½ miles, with low, sandy shores, bordered by mangroves; Ras Pekawi is a low sandy point with a clump of casuarina trees, 70 feet high, on its extreme, and ½ mile off it, and lying on the reef extending fully 2 miles from the point is a bushy islet 17 feet high.

St. Lazarus Bank, 10½ miles in length in a north and south direction, with 6 miles in greatest width, within the 100-fathom contour line, has general depths of from 8 to 15 fathoms, but at its northern end is an area about 3½ miles in length and 1¾ miles in breadth within the 10-fathom contour, which has spots on it of 3½, 4¾, and 5 fathoms; the southern extreme of the bank lies 87°, distant 44½ miles, from Ibo Bluff.

Caution.—As there is no trade on this part of the coast, nothing is gained by approaching the shore by the passages between the inner reefs northward of Ras Pekawi, but if obliged to do so, the most favorable time is at low water with the sun astern of the vessel; the lead should be kept constantly going. No fresh water can be obtained from any of the islands between Ras Pekawi and Cape Delgado; and from this cause the islands remain uninhabited.

Coast.—From Ras Pekawi to Ras Nenumba, 7 miles to the north-northwestward, the coast for the first 4 miles consists of a sandy beach, with numerous villages, where a few fowls may be obtained, but the remainder is mangrove bush intersected by creeks. A wooded range of hills, from 250 to 280 feet high, lies parallel with the coast, from 2 to 3 miles inland, and shore reef, or shore bank under 3 fathoms, extends about 2 miles off the coast.

Kisanga Islet, 20 feet high, and on the western edge of a reef about 2 miles in extent, is sandy, covered with brushwood, and lies 3½ miles east-northeastward of Ras Pekawi.

Mjumbi (Mattos) Island, 2 miles eastward of Kisanga Islet, is low, thickly wooded, and has two trees rising to a height of 77 feet on its southern side; it is surrounded by a reef extending 3 miles northeastward, 1½ miles eastward, and 1 mile in a southerly direction, with patches of sand which dry in places.

Anchorage.—The anchorage westward of Kisanga Islet may be approached with safety either from the northward or southward, care being taken to avoid Gray Rock if entering by Mjumbi Pass. Good anchorage may be obtained in a depth of 8 fathoms, over sand and shells, ½ mile from the reef, with Mjumbi tall trees in line with Kisanga Islet bearing about 79°.

Coast.—From Ras Nenumba to Ras Yamkumbi, a distance of 7½ miles to the northward, the coast is low and swampy, fringed with mangrove, with numerous creeks; the sudden break in the hills at the back forms the most conspicuous feature of this coast.

Mto Marari, 6 miles northward of Ras Nenumba, can be entered by boats drawing 2 feet at low water, and there is deeper water inside; mud and sand flats extend from ½ mile to 1½ miles offshore, with bowlders scattered over them. There is reason to believe that a large village exists on the banks of this river.

Seli-Seli Rocks, near the extreme of a reef extending about 2½ miles eastward of Ras Yamkumbi, are three flat-topped coral rocks, 10 feet high.

Mwamba Wadiazi, a square-shaped reef, about 5 miles in extent, lies on the extreme of shore bank, with depths under 3 fathoms, which extends about 12 miles east-southeastward of Ras Yamkumbi.

Mwamba Wadiazi is composed of coral with several sand banks on it, the rocks uncovering in parts at low water, and the sandbanks at half ebb; its northern, eastern, and southern faces are steep-to, but its western side is broken into a series of gullies with detached masses of coral and shallow water between them. Kero Nyuni (Zanga Island), 20 feet high, and covered with bushes, lies on the northwest extreme of the reef.

Mjumbi Pass, the opening between Mjumbi Reef and Mwamba Wadiazi, is 4 miles wide and perfectly clear of dangers, with central depths of upward of 400 fathoms, the heavy surf on the edges of the reefs marking the channel. In approaching, the mainland shows very indistinctly, but the high trees on Mjumbi Island are clearly visible.

Dangers.—Gray Rock, having 1½ feet at low water, springs, is steep-to, and lies in the fairway to the anchorage off Kisanga Islet, about 2½ miles north-northwestward of the western end of Mjumbi Islet.

Mwamba Mcholi, a coral reef, dry at low water, and about 400 yards in extent, is 5¼ miles southwestward of Kero Nyuni.

Anchorage.—The sheet of water inclosed between Mjumbi and Kero Nyuni Islands and the mainland, with the exception of the dangers mentioned, has anchorage all over it in depths of from 5 to 15 fathoms, over sand and coral, the water shoaling in the northern part, where a bar, with from 1½ to 3 fathoms over it, connects Seli-Seli Rocks with Mwamba Wadiazi.

Mwamba Wanuni, drying 9 feet at low water, is 3 miles long in an east and west direction, and 1 mile wide; a small shoal lies off its western edge; it is mostly steep-to.

Kero Nyuni Pass, 3½ miles wide between Mwamba Wadiazi and Mwamba Wanuni, is deep and clear, with the exception of Mwamba Kizingiti, near the inner end of the pass; a channel exists both northward and southward of this danger.

The outer part of the pass has depths over 200 fathoms, but the 100-fathoms contour line is about 1¼ miles eastward of Mwamba Kizingiti and the depths rapidly decrease toward that danger.

Dangers.—Mwamba Kizingiti, a patch of coral dry at low water, springs, near the center at the inner end of the pass, may be generally seen even when covered, by the sea breaking on it. From it, Kero Nyuni and Seli-Seli Rocks, distant from 3 to 3½ miles, are plainly visible.

Anchorage.—A good anchorage during the southern monsoon is in 6 fathoms, over sand and coral, 1 mile northwestward of Kero Nyuni, and, for a small vessel during the northeast monsoon, ½ mile southwestward from the same islet; there is also anchorage close to the southward of Mwamba Wanuni.

Tides.—It is high water, full and change, at Kero Nyuni, at 4 h. 15 m.; springs rise 13 feet, neaps 8 feet.

Tidal streams.—The tidal streams within the islands are weak and irregular, being greatly influenced by the winds; the west-going stream is usually stronger than the east-going, and enters by the various openings between the reefs. The usual south-going current will be found running about 10 miles outside the reefs.

Fungu Nameguo, a coral reef 4 miles long in a north-northeast and opposite direction, and 2 miles wide, with several drying sand banks on it, is situated about 2 miles northeastward of Mwamba Wanuni; the northernmost sand bank dries 12 feet, but covers at high water, springs, when the sea breaks heavily on it. The seaward edges of this reef are steep-to, and when there is any wind a cross sea is generally experienced off it. There is good anchorage off the inner or western side in from 7 to 10 fathoms.

Nameguo Pass, between Mwamba Wanum and Fungu Nameguo, is 1¾ miles wide between the reefs, and clear of danger. It is the best pass by which a stranger can enter, as the reefs show plainly, and the bottom is even, with fair anchoring ground over the whole of it.

The depths in the pass are from 8 to 9 fathoms.

Dangers.—Mwamba Majiwe Kubwa, lying 1½ miles northwestward of Mwamba Wanuni, with a 5-fathom channel between them, has a sand bank, which dries 11 feet on its northwest portion. Fungu Lamkunama, about 1 mile northward of Mwamba Majiwe Kubwa, separated by a clear channel with from 4½ to 9 fathoms water, is another coral reef, with a sand bank on its western end; it uncovers at low water, springs, and a 2-fathom patch lies ½ mile westward of the sand bank.

Chapman Reef, 1½ miles northward of Fungu Lamkunama, is a coral reef 1,600 yards long, drying at low water, springs, and has deep water all around.

Anchorages.—Good anchorage, in depths of from 7 to 9 fathoms, may be obtained off the western side of Fungu Nameguo, and there is also anchorage in a somewhat similar depth, eastward of the southeast end of Mwamba Majiwe Kubwa.

Coast.—The coast from Ras Yamkumbi trends north-northeastward for about 13 miles to Ras Ulu, and at 5 miles near the mouth of Mto Luseti is Mpandaji, the only village on this coast, while about 1½ miles northeastward, is Ras Mpandaji, 63 feet high, the south point of Naquero Bay.

This coast is all low, bordered by mangroves, and is seldom seen from outside the islands; along it are the mouths of several streams, which dry at low water. The coast reef here extends from the shore from ¾ of a mile to 2½ miles; the mouths of the creeks in this part are dry at low water, and the bottom off the entrances consists of mud, over coral.

Crawford Reefs are several patches of coral 3 miles off this coast, which dry at half-ebb, with from 1 fathom to 2 fathoms between them and the coast reef.

Ras Ulu, the southern extreme of Mazimbwa Bay, is a mangrove point about 80 feet high, making as a series of flat ridges, and having a reef extending fully 5 miles southeastward of it, with Myonji Islet, 66 feet high, thickly wooded near its outer end, and mangrove bushes situated on the reef 1 mile southeastward of the islet, and about 2½ miles from the point; several detached patches lie off the southern side of the reef, while from its northeast side rocks and shoal water extend 1 mile into Myonji Pass.

Water may be obtained from some wells a short distance within Ras Ulu.

Anchorage.—Within the outer reefs there is excellent shelter in from 5 to 12 fathoms, over sand and coral. The best berth depends on the monsoon, the prevailing strong winds being from northeast and southeast.

Tambuzi Island, nearly 2 miles long in an east and west direction, 82 feet high, and lying 5 miles northward of Fungu Nameguo, may be distinguished by being higher than the surrounding islands, and by groups of tall casuarina trees near its extremes; the reef on which this island stands extends for 2 miles on all but the western side, and on its eastern side is a sand bank drying 4 feet at low water.

Tambuzi Pass, between the reefs of Fungu Nameguo and Tambuzi Island, is 3 miles wide, but is divided into two by Bower Shoal, lying in mid-channel and consisting of coral patches, the least water, 1½ fathoms, being near its eastern edge; it may be avoided by not bringing the south extreme of Myonji Islet between the bearings of 261° and 278°.

The outer part of Tambuzi Pass has depths over 100 fathoms, but in the channel southward of Bower Shoal there are from 5½ to 27 fathoms, and in that to the northward from 5½ to 9 fathoms.

Anchorage.—There is good anchorage about ¾ mile westward of Tambuzi Island, in a depth of 9 fathoms, over sand and coral, with Myonji Islet summit bearing about 234°.

Masasari Rock, 3 miles northeastward of Myonji Islet, on the northern side of the entrance to the Myonji Pass, is 3 feet high, with a sand bank, which uncovers at a quarter ebb, 200 yards northwestward of it.

Mwamba Kisanga Mungu embraces the whole of the numerous coral patches and rocks including Mshanga Island near the southern, and Congo Island near the northern, end, and consists of extensive coral reefs, with several sand banks and detached rocks, having from 1 fathom to 2 fathoms water between them.

These coral patches and the shallow water extend in a north and south direction, convex on the east side, over a space of 9 or 10 miles, affording perfect shelter to Mazimbwa Bay within.

Mshanga Island, 54 feet high, and composed of coral, is wooded, and has a reef extending 1 mile eastward and southward from it. Luwinza Rock, 6 feet high, stands on Mwamba Kisanga Mungu Flat at about 1½ miles northeastward of Mshanga. Congo Island, nearly 5 miles northward of Mshanga and 35 feet high, is on the northwestern part of these reefs; from it coral flats extend in all directions.

Myonji Pass, between Myonji and Mshanga Reefs, is 1¾ miles wide, but narrowed to 1 mile by the rocks and shallow water extending northward from the reefs surrounding Myonji and Ras Ulu; it is the only ship channel leading into Mazimbwa Bay.

The depths in Myonji Pass are from 12 to 31 fathoms.

Mazimbwa Bay, northward of Ras Ulu, is a capacious and well-sheltered anchorage; its southern shore, covered with mangroves, has mul flats extending 1 mile off, and is backed by a wooded range 200 feet high. From Ras Niguro, at the entrance to Mto Mazimbwa, on the northern side at the head of the bay, a range of wooded hills extends northward to Cape Delgado.

Ras Niguro is a bold cliffy point, and the highest on this part of the coast, and from it the cliffs continue along the northern shore of the bay for 2 miles; from thence to Ras Msangi the coast is low and sandy, occasionally fringed with mangroves.

Dangers.—At 1 mile off the mud flats in the southern part of the bay is Mwamba Msaro, a narrow coral reef 2 miles in length, drying at low water, springs, lying parallel with the shore, with shallow water between it and the shore reef.

A patch of 4¾ fathoms lies in the bay about 1½ miles westward of Mshanga Island.

Mwamba Kisocha, on the northern side of the anchorage in Mazimbwa Bay, projects 2¾ miles from the mainland, with several detached shoals to the southward, and shallow water reaching 3¾ miles from the shore. Ras Niguro bearing 273°, leads clear of the southern limit of the shallow water; and Ras Msangi tall trees bearing 14°, leads eastward of it.

Directions.—To enter Mazimbwa Bay by Tambuzi Pass, having cleared Bower Shoal as already described, vessels should pass about 1,200 yards southward of Masasari Rock, and then bring it to bear 94°, astern, steering 274°, through Myonji Pass. When the western extreme of Mshanga bears 36°, steer 312°, avoiding the spit extending from Mwamba Msaro, until Ras Niguro bears 278°, when it may be steered for on that bearing, anchoring as convenient in Mazimbwa Bay.

There is also an intricate and almost impracticable channel to this bay from the northward along the edge of the coast shoals.

Anchorage.—In Myonji Pass, the water is too deep for convenient anchorage, but before entering it, or when once through it, a vessel can always anchor, the depths varying from 5 to 10 fathoms, over muddy bottom. A good berth is in 8 fathoms, with Ras Niguro bearing 278°, and Ras Ulu 146°, or a small vessel may anchor nearer the river in about 4 fathoms.

Tidal streams.—The west-going stream is scarcely appreciable, but, at springs, the east-going stream sets at rates of from 2 to 3 knots.

Mto Mazimbwa entered between Ras Levura and Ras Niguro, 1½ miles apart, trends in a northwesterly direction for about 4 miles, and is then lost in a mangrove swamp; boats can only ascend it on a rising tide, and extenside mud flats and sand banks reduce the channel to a few yards in width. A narrow, tortuous 9-foot channel leads in southward of Tulupulu Islet lying in the entrance, and, when within, for some distance there is a general depth of about 9 feet, but holes with depths of from 3 to 6 fathoms, and mostly surrounded by shallows, exist.

Villages.—Mazimbwa village, on the northern side of the creek entrance, has a population of about 400, including several Banians, and on the southern side is Mtamba village; a ruined fort, near Mazimbwa village, is overgrown with weeds and not visible from seaward. The principal export is rubber in a raw state, and the imports American cloth, arms, &c.; a dhow runs monthly to Ibo.

Supplies.—Fowls, goats, sweet potatoes, etc., are obtainable.

Mwamba Tambula, 2¾ miles northward of Tambuzi Reef, is a reef 4 miles in length, with sand banks and bowlders drying from 5 to 9 feet, and is steep-to on the northern and eastern sides, the surf plainly marking its edge. Nyuni Islet, 17 feet high, at the northwestern extreme of the reef, is small, flat, and covered with short grass. Gray patches, extending 2½ miles north-northwestward of Nyuni Islet, are patches of from 2¾ to 3 fathoms, with 4 and 5 fathoms water between them.

Suna Pass, between Tambuzi Island Reef and Mwamba Tambula, is 2¼ miles wide and clear of danger, and may be used by vessels, from the northward, bound to Mazimbwa Bay, afterwards proceeding on either side of Masasari Rock, and from thence as before directed.

Suna Island, from which the pass takes its name, is small and of coral formation, its summit crowned with trees 58 feet above the sea;

it is free from danger on its western side, but a reef extends about 1 mile eastward and southward from it. There is a narrow but apparently clear passage between it and Mwamba Kisanga Mungu Reef to the westward.

As with all these passes, the water is very deep in the entrance, often shoaling from 100 to 200 fathoms to less than 20 fathoms within a distance of 1 mile, but when on the coral formation the bottom becomes very even and the shoaling gradual until close to the reefs. The shoalest water known in this pass is 5½ fathoms nearly in mid-channel.

Ras Msangi, the northern extreme of Mazimbwa Bay, is a well-marked point, 47 feet high; it may be recognized by a clump of casuarina trees, 94 feet high, on its northern side, the most conspicuous object on this part of the mainland. The coast reef extends 1½ miles eastward of Ras Msangi, and shallow water borders the point to a distance of 2¾ miles, and also the coast southwestward as far as Mwamba Kisocha, described on the preceding page.

Kifuki and Mtundo Islands, on one reef extending about 7½ miles, in a curve, in a northeast and opposite direction, are 79 and 80 feet high, respectively, and thickly wooded; the reef extends in places 1½ miles northward, eastward, and southward of these islands, and on it at the northeastern end of Mtundo Island, are Sandcay and Makunga Islet, 23 feet and 8 feet high, respectively.

Nyuni Pass, between Mwamba Tambula and the reefs extending southward from Kifuki and Mtundo Islands, is 3½ miles wide at the entrance, but toward the inner end is narrowed to 1,600 yards, between the 5-fathom contour lines, by Gray Patches on the southern side, and on the northern side by a 3-fathom shoal detached from the Kifuki Island Reefs.

The depths are about 100 fathoms in the outer part of the pass, shoaling to from 9 to 18 fathoms in its narrowest part.

Directions.—To enter Nyuni Pass, steer for Nyuni Islet, bearing between 228° and 239°, until the clump of trees on Ras Msangi (probably the only portion of the mainland visible) bears 290°, when the trees can be steered for; this course leads through it in mid-channel to Kifuki Pass, in not less than 10 fathoms.

Kifuki Pass, between Ras Msangi and the northwest end of Kifuki Island, has in mid-channel a coral shoal of 4¼ fathoms, 600 yards in extent. The western point of Kifuki may be rounded at a distance of 800 yards, but a flat with 1¾ fathoms, and perhaps less water, extends 2 miles eastward of Ras Msangi.

Anchorage.—Good anchorage will be found in depths of 5 or 6 fathoms, over sand and coral, about ¾ mile northward or southward of the western point of Kifuki, according to the monsoon.

Tides.—It is high water, full and change, in Kifuki Pass at 4h. 10 m.; springs rise 14 feet, neaps 9 feet.

Tidal streams.—The northwest-going stream attains a velocity of from 2 to 3 knots at springs, but is scarcely perceptible at neaps.

Coast—Ras Nondo.—The coast from Ras Msangi has a general north-northeast trend for about 10½ miles to Ras Nondo, the land being low and wooded with some small villages situated in coconut groves; drying sand banks, with shoal water under 3 fathoms, extend as much as 4 miles off, so that landing is impracticable except at high water.

Ras Nondo may be easily recognized from the southward by a group of casuarina trees about 80 feet high.

Islets and dangers.—Northward of Kifuki and Mtundo Islands are the following islets and dangers:

Fungu Makunga are detached patches of 2¾ and 3 fathoms, the latter depth being 3½ miles northeastward of Mtundo Island; there is generally a swell in Mtundo Pass, causing the sea to break heavily on these patches at low water.

Mwamba Mtundo, coral and sand patches drying at near low water, extend 1¾ miles northward of Mtundo.

Gulnare Reef, 1 mile west-northwestward of Mwamba Mtundo, has passages on either side of it, which should not be used by small vessels except at low water, when the reefs show plainly.

Penguin Shoal, 1½ miles in extent and 1 mile northward of Gulnare Reef, has a least depth of 1 fathom.

Kisungura and Vumba, wooded islets, 44 and 64 feet high, respectively, are northeastward of the west end of Kifuki Island, and 1½ miles northeastward of the latter islet is a coral flat with a mushroom-shaped islet, 4 feet high, in its center.

Wamizi Island, 92 feet high at its eastern, and 63 feet at its western end, and the highest island in the vicinity, being visible from a distance of about 15 miles, is nearly 8 miles in length in an east and west direction; its western extreme, 2 miles eastward of Ras Nondo, is separated by a boat passage.

The reef on which the island stands, extending in places for 1½ miles to the southward, will be seen on a near approach from that direction to break heavily and to have a white sandy beach behind it. Mkunga, a small wooded islet, 30 feet high, is on the reef at the northeast end of Wamizi Island.

Mtundo Pass, the opening between the dangers northward of Mtundo Island and the south side of Wamizi Island, is 3½ miles wide between Fungu Makunga and Wamizi Reef; there is generally a swell in the pass, causing a break on the former patches. The best channel to the inner anchorage, leading northward of Penguin Shoal, is 1,600 yards in width.

The 100-fathom contour line passes about ½ mile northward of Fungu Makunga and 1½ miles eastward of Penguin Shoal, the outer part of the pass having depths over 300 fathoms; the depths northward of Penguin Shoal, in the channel leading to the inner anchorage, are from 7 to 10 fathoms.

Directions—Anchorage.—To enter Mtundo Pass, keep Vumba Island bearing between 234° and 251°, to avoid the dangers on either side, and when Mkunga Islet, northeastward of Mtundo Island, bears about 180° steer for Ras Nondo, bearing 300°, until the western extreme of Vumba bears 222°, when alter course to 262°, continuing until Vumba west extreme bears 208°, which course should lead to the anchorage in 7 fathoms water, over sand, with Ras Nondo bearing 318°.

The 4-fathom passage westward of Vumba is 600 yards wide and practicable for vessels of light draft only. The channel southward of Penguin Shoal has from 4 to 6 fathoms between the various reefs, but the water shoals to 3¾ fathoms between Vumba and Kisungura, with several patches of from 2 to 3 fathoms.

Maiyapa Bay.—The shores of Maiyapa Bay, between Ras Nondo and Ras Afunji, 12 miles apart, are bordered by extensive sand flats, which, with Mwamba Mpanga-panga, Keramimbi and its surrounding reefs, together with numerous deep holes of 30 and 20 fathoms, limit the anchoring ground to a comparatively small area.

The western shore of the bay near Mto Mluri is mangrove, but the northern and southern portions are sand, and the only prominent features are three casuarina trees, the center and largest, about 70 feet high, being 2½ miles northwestward of Ras Nondo. In the southwestern part of the bay are the rivers Mluri and Maiyapa, Marongo, the principal village, being about 1½ miles northward of the latter, while other small villages may be found amongst the coconut groves; a few fowls, goats, and sweet potatoes may be obtained.

Islet and dangers.—Mwamba Mpanga-panga, nearly 2½ miles north-northeastward of the west end of Wamizi Island, and composed of coral and sand, is 1½ miles in extent, dry in places at low water, springs, and steep-to on all sides; it usually breaks below half tide.

Pollard Shoal, on the northern side of the entrance to Wamizi Pass, and 6 miles northward of the northeast end of Wamizi Island, is ½ mile in extent, with 1½ fathoms water and steep-to.

Keramimbi Island, 40 feet high, on the northern side of the entrance to Maiyapa Bay, is nearly 1 mile in length and thickly wooded. A coral reef, dry at low water, surrounds it to a distance of 1½ miles on its southern and eastern sides and the whole space within the island, as far northward as Ras Afunji, is shallow.

Wamizi Pass, leading into Maiyapa Bay, between the reefs of Wamizi and Rongwi Islands, is 5½ miles wide, and between the reefs of Keramimbi and Wamizi, 3¾ miles; it is deep and clear, with the exception of Mwamba Mpanga-panga.

The 100-fathom contour line passes about 1½ miles from the shoals on either side of the entrance, and is less than 1 mile from Mwamba Mpanga-panga, within which the depths decrease, but there are deep holes, as already mentioned; in the bay they are from 5½ to 19 fathoms.

Directions—Anchorages.—The approach to Maiyapa Bay is by the Wamizi Pass, and when entering, Mkunga Islet, off the northeastern end of Wamizi Island, should be passed at a distance of 2 or 3 miles; when that islet bears 113° it will show clear of Wamizi Island, and, if kept on this bearing astern, steering 293°, will lead to an anchorage in a depth of about 10 fathoms, over sand and shells, with the eastern point of Keramimbi bearing 9°.

If seeking a more sheltered anchorage: from the position just given, steer for the large tree, westward of Ras Nondo, bearing 239°, until the western end of Wamizi bears 173°, when alter course to 329° and anchor as convenient in from 6 to 10 fathoms, over sand and coral.

Anchorage may also be taken under the western edge of Mpanga-panga Reef, for which see the chart. The British naval vessel *Nassau* rode out a strong southeasterly gale in smooth water, ½ mile southwestward of this reef in 6 fathoms water, over sand and coral.

Tidal streams.—In Maiyapa Bay both streams attain velocities of from 2 to 4 knots, at springs.

Port Mluri.—A tongue of sand, dry at half ebb, on which are Letumba, an islet 30 feet high, and Fungu Mseruro, a drift sand bank, projects 2½ miles northward from the southwest shore of Maiyapa Bay, and shallow water extends 2 miles farther in a north-northeast direction, westward of which is the channel to Port Mluri. This channel is narrow, with a 1½-fathoms shoal partly blocking the fairway; the anchoring ground in the port has from 7 to 10 fathoms, over mud, but is adapted for small vessels only. The Portuguese have a settlement here.

Coast.—**Ras Afunji**, 15 feet high, the southern point of Tunghi Bay, is fronted by a sand bank which dries out fully 1 mile at low water.

Rongwi and Tekomaji Islands stand on one continuous coral reef, upwards of 9 miles in length, in a north and south direction, the seaward edge of which is steep-to; both islands are low and flat, but densely wooded; the outer coast of Tekomaji is rocky, but that of Rongwi is principally sandy beach. The reef skirts the islands generally to a distance of 1 mile, and on the southeastern part, where it extends farther off, there are several detached black rocks uncovering at half ebb.

Rongwi Island, separated from Ras Afunji by a channel 1 mile in width between the dangers on either side, and with 4 or 5 feet water, is 1½ miles southward of Tekomaji; off its northwestern point is Kamesi, a wooded islet 40 feet high. Tekomaji is of triangular shape, 2 miles long.

When approaching these islands from seaward, the only distinguishing features are two rounded clumps of trees 94 feet high, on the northeastern part of Rongwi; and, when within 6 miles, three casuarina trees may be seen on the eastern shore of Tekomaji; there are also one or more casuarina trees on the northwestern point of Tekomaji.

Tunghi Bay, between Ras Afunji and Cape Delgado, is about 8 miles wide, with a sandy beach around its shores except between Kiuya (Tunghi) village and Cape Delgado, which portion is rocky; between Ras Afunji and the head of the bay it is low and flat, and thence to Cape Delgado it is from 80 to 200 feet high.

On the wooded ridge, westward of Mnangani village, is a conspicuous baobab tree about 250 feet, and 1 mile to the northward, a compact group of these trees is 228 feet high; the former tree is on the highest ground anywhere in the vicinity of Cape Delgado.

Cape Delgado, the northern point of entrance to Tunghi Bay, is the low extremity of a peninsula extending 4 miles eastward, and ½ mile within the south side of the cape is a conspicuous palm tree, 75 feet high, while on the north side of the cape is a hill 85 feet high; a reef which is steep-to with no outlying patches extends from southeastward of the cape round the north side of the peninsula, being fully 1 mile off in places.

Light.—Near the extreme of the cape a fixed white light is exhibited at an elevation of 59 feet above high water from a black wooden tower, and is visible 3 miles. Far bearings of arc of visibility, see Light List.

Dangers.—The reef surrounding Tekomaji Island, which extends nearly 1¼ miles northeastward and northward of it, is steep-to and, with Cape Delgado Reef, is usually marked by surf.

From Ras Afunji round the head of the bay to Kiuya village, sand and coral flats stretch 1 mile offshore, and shallow water extends considerably beyond. A patch of 2¾ fathoms lies outside the shore bank and nearly 3 miles southward of Kiuya village, while farther in a 2½-fathom patch, also outside the shore bank, is 2 miles south-southeastward of Mto Mnungi.

Mto Mnangani, running into the head of Tunghi Bay, is 600 yards wide at its entrance, but banks, drying at low water, narrow it to less than 200 yards; canoes can ascend only 1½ miles from the mouth. Mnangani village is on the western bank at the entrance.

Channel.—The entrance between the reef northward of Tekomaji Island and the shore bank southward of Cape Delgado Peninsula, is 1¾ miles in width, continuing for about 6 miles, and is then reduced to about ¾ mile between the shore bank on the south side and the 2½-fathom patch on the north.

The 100-fathom contour line cuts into the entrance between the west end of Tekomaji Island and Cape Delgado, and within that the depths decrease to from 8 to 18 fathoms in the fairway; there is a depth of 10 fathoms in the narrow part and from 8 to 9 fathoms in the outer part of the channel of Mto Mnangani.

Buoys.—In the narrow part of the channel a black spherical buoy is moored on the south and a red spherical buoy on the north side.

Directions—Anchorage.—Cape Delgado Lighthouse and the group of baobabs near Mnangani village assist in identifying Tunghi Bay, and the best time to enter is in the morning, the group of baobab trees, bearing 265°, leading in mid-channel; soundings will not be obtained with the hand lead until Ras Afunji is well open westward of Tekomaji Island, bearing about 180°.

When Ras Afunji bears 177° a vessel of deep draft should either anchor or steer for it on that bearing, anchoring westward of the north extreme of Tekomaji Island, with its west extreme bearing from 104° to 117°, the anchorage being sheltered. Vessels of light draft could continue with the baobabs bearing 265°, anchoring in from 6 to 9 fathoms, over mud, when Ras Afunji bears 144°, but the swell is sometimes considerable at this anchorage. A small vessel might pass between the black and red buoys and anchor off Mto Mnangani in 9 or 10 fathoms.

Tides.—It is high water, full and change, in Tunghi Bay, at 4 h. 5 m.; springs rise 14 feet, neaps 9 feet.

Kiuya Village, or Tunghi, is concealed from view by a belt of thick mangrove bushes fronting the shore, but its position may be readily identified by a thick grove of coconut trees; an old fort in the village is a small square building in a dilapidated state. Dhows, with masts down, lie completely hidden in small creeks in the mangroves.

Supplies.—A few fowls, eggs, etc., are usually obtainable, and firewood, which may be cut on any part of the coast between Ras Pekawi and Cape Delgado, is generally ill adapted for steaming purposes, but by a careful selection of trees many of them might advantageously be used with coal.

Climate.—The fever months here are coincident with the principal rainy months, viz, February to May.

Winds.—The general experience gained in the British naval vessel *Nassau*, whilst surveying the coast, was as follows: Northeast winds from December to March, getting lighter as the season progresses, varied occasionally by heavy squalls of wind and rain from northwest, accompanied by vivid lightning and heavy thunder.

The change of monsoons takes place in April; heavy squalls then frequently occur from south and southwest, but by the beginning of May the steady southern monsoon has set in, the wind generally freshening in the afternoon to a strong breeze, and from this month the force gradually lessens, and the wind veers to the eastward.

By October very light easterly winds prevail, the change to the northeast monsoon taking place gradually in the early part of November, accompanied by a few light showers.

Between the islands and the mainland, sea and land breezes prevail, the former, during May and June, blow very fresh.

Currents.—The separation of the equatorial current takes place between the parallels of about latitude 10° or 11° 0′ south, in the vicinity of Cape Delgado. During the height of the northeast monsoon the separation is at its maximum northern limit, and vice versa.

CHAPTER VIII.

CAPE DELGADO TO RAS KANZI.

Coast.—From Cape Delgado, the coast is low and thickly wooded as far as Ras Swafo, a distance of 14 miles; between are Mbwezi and Keonga Bays, separated from each other by Ras Nasunga, the shore being for the whole distance skirted by reefs. The long ocean swell generally breaks heavily on these reefs, which are thus made visible for some distance.

Mbwezi Bay, between Cape Delgado and Ras Nasunga, is about 3¼ miles wide between the reefs, with a long white sandy beach in its western part. There is, however, no anchorage in this bay, the depths being from 150 to 200 fathoms in the entrance, and the reefs which skirt the coast steep-to; as there are no creeks, landing is seldom practicable.

Mbwezi village stands on the southwest side of the bay, near the southern end of the sandy beach, in a grove of coconut trees.

Ras Nasunga, which is low, may be recognized by the number of detached rocks off it, and has a reef, with bowlders on its outer edge, extending in a southeasterly direction 1½ miles from it, diminishing in width to about 1,600 yards near the village of Mbwezi, and from thence round Cape Delgado. The sea generally breaks on the outer edge, while on the reef, but within the edge, it may be comparatively smooth.

Keonga Bay is 4 miles wide between Ras Nasunga and Ras Samadudu, and from the latter northward, the coast is low, thickly wooded, and with a fringing reef 1½ miles wide; Mwamba Ricoma, the southern termination of this coast reef, drying in places, at low water, forms the northern boundary of Keonga Bay.

There are also a number of sand banks that dry at low water, springs, near the head of the bay, but the water deepens rapidly outside the 5-fathoms contour line, affording but little anchorage space, and the bottom is rocky in places; within the same line are shallow heads of coral, of which several dry.

The Keonga, the Letonda, its mouth known by tall casuarina trees on its northern side, and the Mpambi, at the head of Keonga Bay, are arms of the sea; Mto Mpambi is said to join Mto Decomba to the northwestward at spring tides, when it affords a passage for canoes.

Buoyage.—The best water from the bay to Mto Letonda is indicated by three red and black vertically striped conical buoys, marked K1, K2, and K3. The fairway buoy, K1, is surmounted by a St. Andrew's cross, and moored in 11 fathoms, at nearly 2 miles from the mouth of the Letonda.

The other two buoys, moored in mid-channel, in about 16 feet water, have the letter and number on them in white.

Directions—Anchorage.—To proceed to the anchorage in Keonga Bay steer for Ras Nasunga, bearing 192°, until in 10 fathoms water, when the anchor may be immediately let go, but the best anchorage is in a depth of 7½ fathoms, over sand, on this bearing of Ras Nasunga, and with the northernmost point of land seen bearing 327° and the south point of Mto Keonga, 274°.

Small craft can enter Mto Letonda, guided by the buoys, but local assistance should be obtained; in the creek, the southern shore must be kept aboard. The channel leading to Keonga is shallow and tortuous; boats should only ascend it with a rising tide.

Tides.—It is high water, full and change, in Keonga Bay at 4 h. 10 m.; springs rise 12 feet.

Village.—Keonga Village, about 2 miles up on the southern side of Keonga Creek, stands in a grove of coconut trees on a small ridge 70 feet high; it is frequented by trading dhows, and has a population of about 4,000. There is a well of good water before the village, but other supplies are not obtainable.

Rovuma Bay is contained between Ras Swafo and Ras Matunda, the distance between being about 9 miles and the bay receding about 4 miles to the river entrance.

Ras Swafo (Cape Rovuma), the southeastern point of Rovuma Bay is low and thickly wooded, with a small conical hillock, 77 feet high, ¼ mile inland; this hillock is conspicuous when near the land. Northward of Ras Swafo, the reef dries in patches about 1,400 yards from the shore at low water, springs, and for 1½ miles the depths are only from 1 fathom to 2 fathoms. The edge of this bank is steep-to, and the tidal streams run strongly, making a wide berth necessary.

From Ras Swafo, round the head of the bay to Mto Letokoto, the shore is bordered with mangrove trees, and is nearly all swamp at high water, springs. About 2 miles northward of the entrance to Rovuma River, close to the shore, is a conspicuous square clump of trees, and 1¼ miles farther northward is a group of three tall trees, which from seaward forms one of the most prominent features in Rovuma Bay.

Mto Decomba is a creek ¾ mile westward of Ras Swafo, with a bar on which the sea generally breaks heavily, but it is sometimes possible for a boat to get in at half tide. Within the bar there is from 2 to 3 fathoms water for 1 mile, and, as before stated, it is said to be navigable for canoes to Keonga Bay, at high water, springs.

Mto Mquango is a small creek eastward of the Rovuma River, into which boats can enter at high water, springs, but some little distance up it is almost impassable even for canoes; the sea generally breaks heavily off the entrance of this creek.

Mto Letokoto, a creek northward of the Rovuma River, is about ¾ mile wide at the entrance and reported to be navigable by canoes for 15 miles, where it joints the Rovuma River, but the bar dries across the mouth.

Ras Matunda, the northern point of the bay, may be recognized by a series of white sand hills, near the coast, about 80 feet high and 1 mile in extent; a single tall tree on their northeastern extreme is conspicuous either from the northward or southward. The fringing coast reef dries nearly 1 mile off the ras, from whence it trends southwestward to the remarkable square clump of trees southward of Mto Letokoto, where its width decreases to 300 yards, but with shallow water some distance beyond.

Hills.—Kilima Mundo, a rather sharp, well-wooded peak, 350 feet high, on the southern side of the Rovuma River, and 6 miles within the entrance, is the highest land in the vicinity. Kilima Macheriuka, northward of Rovuma River and 6½ miles inland, is the southeastern shoulder of a flat range extending to the northwestward, which may be readily identified by three large baobab trees near the summit of its eastern face, one of which is about 341 feet above the sea.

Anchorage.—There is good anchorage on the southern side of Rovuma Bay in 7 fathoms water, over mud, with Ras Matunda bearing 337°, Kilima Mundo 226°, and the extreme of Ras Swafo 125°. Less swell is experienced here than in other parts of the bay.

Good anchorage may also be obtained on the northern side of the bay in a depth of 10 fathoms over mud, with Ras Matunda bearing 358°, and the remarkable square clump of trees southward of Mto Letokoko, 268°. There is no anchorage immediately off Rovuma River entrance, as the bank is very steep, and the depth decreases from 90 fathoms to 5 fathoms within a distance of 400 yards.

Landing.—Westward of Mto Decomba is a long, flat, sandy beach, on which it is possible to land occasionally, but between Rovuma River and Ras Matunda it is seldom possible to effect a landing, the bay being open to the ocean swell and heavy-breaking rollers at all times.

Tides.—It is high water, full and change, in Rovuma Bay at 4 h. 10 m.; springs rise 12 feet.

Tidal streams.—The stream of the rising tide in the bay sets southeastward, and the other stream in a contrary direction; when the river is high the stream runs out without ceasing, overcoming the in-going stream.

Rovuma River is about ¾ mile wide between the trees on either side of its mouth, but at low water this width is reduced to less than half by a sand bank that dries from the western shore. From thence the direction of the river is southwestward, but when examined in September, during the dry season, the river being then very low, about 2 miles within the entrance it was obstructed by sand banks in places nearly dry at low water, springs.

Although there is no bar the great depth of water immediately outside the river, changing suddenly to 30 fathoms, causes dangerous overfalls, especially when the wind is blowing from the eastward, rendering it at such times unsafe for a boat to attempt to enter, the sea breaking right across; the out-going stream runs stronger near the mouth of the river than a rowing boat could stem.

The entrance is not easily made out until abreast of it, and there are several smaller openings both northward and eastward of it. The muddy water from the river extends into deep water, and the clearly defined line of meeting with the blue water is very noticeable.

Inland navigation.—About 2 miles within the mouth of the river, sand banks commence and render the navigation intricate, the channel being narrow, with a depth of only a few feet in places, and here and there crossing abruptly from one side of the river to the other. The navigation of the Rovuma depends much on the season, it being highest in March and lowest about October.

The British navel vessel *Pioneer*, in March, 1861, ascended the river for a distance of 30 miles, and found that the water subsided in the middle of the month, but rose again nearly to its former height at its end, the examination of the river being made between these period; at the turning point there appeared to be no impediment to further progress, but as the water began to fall rapidly it was considered advisable to return to the entrance, in doing which a depth of 5 feet only was found in places, the stream running 3 knots.

In September, 1862, Dr. Livingstone ascended the river in boats for 156 miles, and proceeded to latitude 11° 53′ south, longitude 38° 36′ east, just below Nyamatolo Island, and about 114 miles as the crow flies from the coast; the ascent occupied 15 days and the descent 10 days. The river was unusually low, entailing frequent dragging the boats over the shallow parts.

The river bed, about ¾ mile wide, was flanked by well-wooded tableland, apparently ranges of hills 500 feet high, and sometimes the spurs of the hills came close to the river, but there was generally about 1 mile of alluvial soil between the highland and the bank.

About 60 miles up the river the tableland receded and there was an immense plain with detached granite rocks and hills dotted about it, while here some rocks appeared in the river. At Nyamatolo Island the river bed was all rocky, the water rushing through numerous channels between rocky masses 4 or 5 feet out of water, which were said to be navigable for canoes.

The distance from Ngomano, 30 miles above Nyamatolo Island, to Lake Nyasa, was said to be about 12 days' journey. The Lujenda River, rising in the mountains on the southeastern side of Lake Nyasa, enters the Rovuma at Ngomano, and there is a route to Lake Kilwa along its banks, but the stream is only ankle deep in the dry season.

Natives.—There are but few inhabitants near the mouth of the river, but farther up are numerous villages, some on sand islets in the river.

Supplies, etc.—Only a scanty supply of provisions is to be obtained from the natives; the tsetse fly is met with along the Rovuma, and the people in consequence have no cattle. The river water affects people adversely until accustomed to it. Wood for steamers may be procured.

Msimbati Channel.—From Ras Matunda the coast and reef trend in a northwest direction for 4 miles to Ras Ruvura, the latter, which is steep-to, extending from 1,000 to 1,600 yards from the shore. Msimbati Channel, from 800 to 1,400 yards in width, is a break between the reef at Ras Ruvura and that extending from Mana Hawanja Island, on the northwest side.

From the northwestern side of entrance to this channel a reef nearly 2 miles in width, and with two islets on it, protects Mnazi Bay, extending 10 miles to the northwestward, where it turns westward to Mikindani Bay.

Mana Hawanja, the southeastern islet, about ½ mile within the edge of the reef forming the pass, is 83 feet high, and covered with trees.

Mongo, the larger islet, is thickly wooded, and has a number of tall trees near its northwestern extreme that show well from the northward; southwestward of that extreme Nakitumbi Island is connected with it by a bank of sand which dries soon after high water.

Shoal.—A shoal with a depth of 2½ fathoms has been discovered about 8 miles 17° from Ras Ruvura.

Mnazi Bay, the large sheet of water within the coral reef which surrounds the islands of Mana Hawanja and Mongo, is about 8 miles long in a northwest and southeast direction, or 12 miles including the shallow portion at the northwestern end, and about 5 miles wide from Msimbati Channel, to the southwestern bight of the bay; its extremes are shallow but the middle is clear, the bottom being sand and coral.

A bank of sand and coral, extending from ½ mile to 1½ miles offshore, fringes the whole of the bay from Ras Msimbati to Ras Sangamku, which makes landing difficult, except at high water, when it is practicable at Mnazi village.

Depths.—The depths in Msimbati Channel are from 20 to 44 fathoms, shoaling to from 7 to 16 fathoms in the clear space of the bay.

Dangers.—Fungu Achumbu, a coral reef, 1¼ miles in length, drying in patches at low water, is situated with its northeastern end lying about 1 mile westward of Ras Msimbati, the inner entrance point on the southeast side. At 600 yards eastward of this end of Fungu Achumbu, and in line with Ras Msimbati, is a patch, awash at low water, with a deep-water passage on each side.

A coral patch, drying at low water, and lying nearly 1 mile northwestward of the ras, is on a bank of sand and coral, 1,300 yards in extent within the 5-fathoms contour line, with depths varying from 1¾ to 4½ fathoms, nearly in mid-channel.

Directions.—From abreast of the entrance, steer in between the the reefs, with Ras Msimbati bearing 198°, until the south extreme of Mana Hawanja Island bears 305°; then steer 218° in order to avoid the coral flat, with from 2 to 3 fathoms, which extends offshore northward of Ras Msimbati, and when that point bears 170° it can be steered for, anchoring as convenient in depths of from 10 to 15 fathoms, over sand.

Should the wind be fresh from the northward, a better anchorage will be found southward of Mana Hawanja Island; to reach this anchorage, steer in as before for Ras Msimbati until the southwestern point of Mana Hawanja Island bears 316°, then alter course to 307°, and anchor in from 10 to 13 fathoms as convenient.

Tides.—It is high water, full and change, in Mnazi Bay at 4 h. 0 m.; springs rise 11 feet.

Tidal streams.—The stream in Msimbati Channel runs at rates of from 4 to 5 knots at springs, with heavy overfalls off the point of the reef extending southeastward of Mana Hawanja Island. There is very little tidal stream within the bay, but outside the streams, following the direction of the coast, running northwestward and southeastward, and attaining velocities of from 2 to 3 knots, at springs, are strongest near the reefs, the southeast-going stream being that of the rising tide.

Village.—Mnazi is a small village on the southwest shore of the bay, and goats, poultry, and eggs may be procured.

Wood and water.—Mangrove wood for steaming purposes can be procured on any part of this coast, but if native labor can not be obtained, it is as well, if possible, to shun the fever-breeding swamps in which the mangrove chiefly thrives.

Water for boats could be obtained from a well near the coast, about ¼ mile northward of Ras Msimbati, but there is no place between Cape Delgado and Mikindani Bay where a vessel can obtain water with facility.

Mikindani Bay, the entrance to which lies between Ras Sangamku and Cape Paman, is there about 4½ miles wide between the reefs on either side. Mwamba Aveu, a steep-to drying coral reef, extends fully 1½ miles northward of Ras Sangamku, on the east, and a similar reef extends 1,600 yards off Cape Paman and the coast northeastward of it, on the west side. The shores of the bay are fringed by coral flats, drying in patches at low water, springs, and extending from 600 yards to 1 mile off.

Mikindani Bay may be readily identified from seaward by Mlima Mjoho, a remarkable conical hill, 617 feet high, and wooded, about 10 miles southwestward of the center of the entrance; also, if within 7 miles of the entrance, by Hull Rocks, 62 and 54 feet high, close eastward of Cape Paman, and forming a mass of conglomerate coral covered with brushwood. Both sides of the bay are low and thickly wooded, while at the head, over Mikidani Harbor, the hills rise from 300 to 617 feet above the sea level; about 2 miles southwestward of Ras Sangamku is a conspicuous high tree.

Shangani Shoal, a patch with a least depth of 3 fathoms, over coral and sand, and deep water all around it, lies in the fairway to Mto Mtwara on the southeast side of the bay, and nearly 2 miles northward of the entrance to that harbor.

A shoal with a least depth of 6 fathoms has been discovered about 800 yards from Shangani Shoal in Mikindani Bay. It has not been examined.

Anchorage.—The only anchorage in the open bay is on its eastern side, between Shangani Shoal and the reef fringing that side of the bay.

Mto Mtwara, a spacious and well-sheltered harbor, entered on the southeastern side of Mikindani Bay,.is 3½ miles long by 1¼ miles wide, and affords good anchorage over the greater part of it. The entrance is deep, and from 300 to 400 yards wide between Mwamba Ribunda and Mwamba Shangani, the coral flats fringing the coast on either side.

Messemo Point, on the eastern side of the entrance, has near it a conspicuous tree which leans to the westward and has drooping foliage.

Messemo Sand Pit, on the eastern side of the channel and about 1½ miles within the edge of the reefs, is steep-to, as is Ras Richemerero, the western point of entrance, but shoal water extends about 200 yards in the bight southward of it. Patches of from 2 to 3 fathoms lie near the middle of the harbor, as shown on the plan. On the southern side is Mto Pwazie, a creek with from 3½ to 6 fathoms for the first mile within the entrance, and extending about 1 mile farther southward, when it becomes lost in the mangroves.

Depths.—Mikindani Bay is deep, having 280 fathoms in the center of the entrance, but there are depths of from 9 to 16 fathoms about ½ mile off the reef, southeastward of Shangani Shoal. The entrance to Mto Mtwara has 20 fathoms water, and within the depths are from 6 to 20 fathoms.

Directions.—To avoid the Shangani Shoal, when entering Mto Mtwara, keep Hull highest rock bearing 313° astern, or Ras Richemerero ahead, bearing eastward of 168° until Ras Sangamku bears 69°, when with a good lookout aloft, there is no difficulty in entering the harbor with the sun astern, the eye and color of the water being the best guides.

When past Ras Richemerero, if entering with the ingoing stream, keep well over on the eastern side, but if the outgoing stream is running, keep toward Mtwara village to allow for turning, as the stream runs sharply round Messemo Sandspit at rates of from 2½ to 3 knots.

Anchorage.—The best temporary berth is near Messemo Spit, in 14 fathoms water, over sand, with the end of the spit bearing 284°, and a conspicuous cliff on the southwest side of the bay, 210°. If intending to make any stay, there is better anchorage under the northern shore farther up the harbor, in from 7 to 10 fathoms over mud.

Tides.—It is high water, full and change, at Mto Mtwara Harbor at 3 h. 45 m.; springs rise 12 feet.

Tidal streams.—The tidal streams are strong at the western anchorage as well as in the entrance channel.

Supplies.—At three villages on the shores of the harbor small supplies are obtainable.

Misete Creek, between Mto Mtwara and Mikindani Harbor, has an entrance about 300 yards wide between Mwamba Shangani and Mwamba Dadi, and within the entrance it expands into a basin nearly ½ mile wide, with a bottom of sand and pebbles. A small vessel would be well sheltered here, but with the harbors of Mikindani and Mto Mtwara so near, there could be no object in entering such a confined space.

The depth in the entrance is 10 fathoms, decreasing to 3¼ fathoms 1¼ miles within; the basin at the head has from 1¾ to 3¼ fathoms.

Mikindani (Pimlea) Harbor, at the head of Mikindani Bay, affords secure anchorage, but the entrance channel is only 300 yards wide in one place between the coral flats projecting on either side.

Nearly ½ mile southward of the head of the bay is Bismarck Hill, 348 feet high, and about halfway up its northern slope is a white house with a tower, visible from a considerable distance seaward.

The depths on the anchorage channel are from 5¾ to 12 fathoms, and 7 fathoms at the anchorage.

Dangers.—At ½ mile southwestward of Pemba Point, on a shoal spit projecting from the western side of the harbor, is a rock with less than 6 feet water, and 850 yards farther in nearly the same direction is a rock with 2¼ fathoms.

In the southern part of the bay, 600 yards north-northeastward of the customhouse, are two rocks awash at low water, and a third rock lies nearly 400 yards from the customhouse on the same bearing; eastward of this, shore bank, with depths under 2 fathoms, extends 1,200 yards from the south shore, and the western shore is shoal for about 800 yards.

Buoys.—The eastern side of the entrance channel is marked by two black conical buoys, marked, in white, 1/MIK and 2/MIK.

The western side of the channel has two red spar buoys, marked, in white, A/MIK and B/MIK, the outer surmounted by a triangle.

The east side of the 2¼-fathom rock, nearly in the center of the bay, is marked by a white spar buoy, surmounted by a ball.

A white conical buoy, surmounted by two triangles, is moored on the north side of the two rocks, 600 yards northward of the customhouse.

Directions—Anchorage.—To enter Mikindani Harbor from the northward, after passing ½ mile outside Hull Rocks, a 185° course leads up to about 1 mile eastward of Ras Managumba, a sharp rocky point, 15 feet high, with two villages northward of it, on the western side of the bay.

From this steer about 210°, bringing the district office, a building with a tower halfway up a hill, at the head of the harbor, in line with Gunia Point, passing between the red spar buoy and the black conical buoys, at the entrance, and farther in.

When within the entrance points, steer about 215° for the customhouse, a low white house near the shore flanked by two small towers, anchoring in about 6½ fathoms water, over mud, when Mirumba Fort bears about 254°.

The channel is so narrow that a vessel is easily conned by eye when the sun is in a favorable position; the reefs on either side show at low water.

Tides.—It is high water, full and change, in Mikindani Harbor at 3 h. 50 m.; springs rise 12 feet.

Tidal streams.—The tidal stream in the harbor is scarcely perceptible.

Village.—The houses of the village of Mikindani extend along the shore, from eastward of the customhouse to Mirumba Fort.

Communication.—A coasting steamer calls regularly at the port, and there is telegraphic communication with Kilwa, Dar es Salaam, and other coast ports to the northward.

Supplies.—The usual small supplies of poultry and eggs are obtainable at the village, but the water is bad, although a spring of good water exists in the neighborhood.

Trade, etc.—The principal products of the neighborhood are gum copal, ivory, seeds, and rice, which are exchanged for European commodities, chiefly through the Banians. Mikindani is reputed to be the most unhealthy port of German East Africa.

Coast.—From Cape Paman, the northwestern extreme of Mikindani Bay, to Mgau Mwania, 10 miles west-northwestward, the coast is low and bordered by a reef extending from 1,400 to 1,600 yards to 1½ miles offshore; the only remarkable feature is a dark clump of trees, 80 feet high, 3½ miles beyond Cape Paman. When off Mgau Mwania, Mlima Mjoho, already described, shows as the southern extreme of the hilly range.

From Mgau Mwania to Mto Lindi, about 16 miles northwestward, the coast is again low, with a reef extending from ½ mile to 1½ miles off; from Mto Lindi the coast turns to the northward continuing low to Mzungu Bay, a distance of 27 miles, with some mangrove islets on the reef, which, southward of Ras Kera, extends about 1 mile offshore, the land at the back becoming bolder near Ras Kera.

At 2 or 3 miles inland, a wooded range, 400 feet high, extends parallel with the shore. From Mzungu Bay to Kiswere Harbor the coast is rocky.

Mgau Mwania, or Mungulho River, entered between Fungu Chosan and Fungu Gomani, the coral reefs extending about 1 mile off the east and west entrance points, respectively, may be easily distinguished by the break in the land when the river opens bearing about 220°, and also by the Madjovi or Mushroom Rocks, 15 feet high, situated 400 yards within the edge of Fungu Gomani.

During the southern monsoon in the afternoon when the wind is from about east-southeast, and also when the northern monsoon is strong, the sea at times appears to break nearly across the entrance, which has a width of about 400 yards.

Reefs.—Nymphe Shoal, about ½ mile in extent, within the 5-fathom contour line, with a least depth of 2½ fathoms, lies in the fairway of the approach to the river entrance, and 1.7 miles northeastward of Madjovi Rock.

Fungu Chosan and Fungu Gomani, the fringing coral reefs on each side of the entrance, are continued seaward by shoal water, with depths under 3 fathoms, for a distance of about 1,200 yards, and outside the edges are some detached patches of from 2¼ to 3 fathoms.

Ras Swa-Swa, a point on the east side of the channel, nearly 2½ miles within the entrance, has a spit extending 400 yards westward of it, with shallow water about 200 yards beyond, and isolated patches dry at from 400 to 600 yards off the southern shore, on the southeast side of Mto Sudi.

Directions.—Approaching Mgau Mwania do not close the coast within 2½ miles until the white customhouse at the western extreme of the beach at Sudi is well open, and bringing it in line with a gap in the distant hills, bearing 201°, it leads westward of the Nymphe Shoal and up to the entrance of the river.

When Madjovi High Rock bears 224° edge to the eastward until the old customhouse is well open of the sand spit of Ras Swa-Swa, and steering for the white customhouse leads in mid-channel to the anchorage off Mwania.

If bound to the anchorage above Ras Swa-Swa, keep as nearly as possible in mid-channel, edging slightly to the westward when nearing Ras Swa-Swa until nearly abreast Mto Mwepi to avoid the spit extending 400 yards from that point, and also the coral patch on the opposite side of the channel, and then keeping southeastward into Mto Sudi. The spit extending from Ras Swa-Swa shows by discoloration, even at high water.

Anchorages.—Temporary anchorage may be found within Nymphe Shoal in a depth of 9 fathoms, over sand and coral, with the highest Madjovi Rock bearing 215°, distant about 1 mile.

A convenient anchorage for vessels of war is in mid-river in a depth of 9 fathoms, over mud, about 400 yards west-northwestward of the point close to the southwest end of Mwania village, while in Mto Sudi a vessel can anchor in 6 fathoms, over sand, ¼ mile southwestward of Ras Swa-Swa, or in from 7½ to 8 fathoms off Sudi village.

Tides.—It is high water, full and change, at Mgau Mwania at 3 h. 45 m.; springs rise 12 feet.

Tidal streams.—Off the entrance the stream of the rising tide runs northward and the other stream southeastward at rates of from 2 to 3 knots, the north-going stream being the stronger during the southern monsoon.

Villages—Supplies.—There are several villages on the banks of Mgau Mwania, but at none of them can supplies beyond a few fowls and country fruits be obtained. On the eastern point of the entrance is Mkiya, and about 600 yards farther in is the larger village of Mwania. Sudi, the principal village, and the only one where good water is to be found, is on the western bank above Ras Swa-Swa and about 3 miles from the entrance.

Lindi Bay lies between Ras Shuka on the southern, and Ras Banura or Kiremba Point on the northern, side, 3¾ miles apart; Ras Banura is a cliffy point above 25 feet high. The hills over the western shore, rising to a height of 976 feet, are well wooded, and cultivated in patches; Mlima Mdemba, 947 feet high, and about 7 miles westward of Ras Banura, has a grove of coconut trees on its summit.

Mto Lindi enters the bay in its southwestern corner and about 5 miles south-southwestward of the entrance are Mlima Atu and Mlima Nuni, 699 and 733 feet high, respectively.

The depths in the outer part of the bay are from 50 to 250 fathoms, but in the inner part the 20 and 5 fathoms contour lines are close together at about 2 miles from the head of the bay, the whole portion within that being shallow.

Dangers.—On the southern side of the entrance, Fungu Myangi extends about ½ mile northward of Ras Shuka, but from thence westward to Ras Rungi, the fringing reef does not extend more than 600 yards; the outer edge of Fungu Myangi is a ridge of dead coral and bowlders, the top of which covers at three-quarters flood, and on it the sea sometimes breaks heavily. On the northern side of the bay the coast reef extends 600 yards in places, and the fringing reefs on both sides are steep-to.

Umtamar Shoal, the outer extreme of the shallow water extending 1.4 miles north-northwestward of Ras Rungi, has a least depth of 1½ fathoms at low water, springs.

Directions.—Approaching from the eastward, the land about Lindi Bay, being the highest on the coast between Mikindani and Zanzibar, can not be mistaken, and from either the southward or the northward the great indentation in the coastline, together with this high land, are sufficient to indicate its position.

Bound to Lindi Bay from the northward, the coast should be given a berth of 1 mile, until abreast of Ras Banura, and from this position, a number of buildings near Ras Ekapapa and the northern end of Lindi town, on the western point of entrance to Mto Lindi, will be seen.

Anchorages.—There is fair anchorage along the northern side of Lindi Bay during the northeast monsoon between Ras Ekapapa and Ras Mungu, in a depth of 8 fathoms, over sand, with the south extreme of the land eastward of Ras Ekapapa bearing 70°, and Ras Rungi about 201°; also a temporary anchorage in 5 fathoms, mud, off Ras Rungi, with the center of Mwentengi village bearing 143°, and Ras Rungi 190°. The best anchorage, however, as regards holding ground, shelter, and convenience for vessels of moderate draft visiting Lindi, is off the town, within the bar, as described on the following page.

Tides.—It is high water, full and change, at Mto Lindi at 4 h. 5 m.; springs rise 11 feet.

Tidal streams.—The tidal streams in the bay, outside the bank of soundings, are not strong, but within Ras Rungi they run from 2 to 3 knots, the outgoing stream being very strong during the rainy season, when a vessel seldom swings to the contrary stream.

Mto Lindi.—The entrance to the river is nearly ½ mile wide between its banks, but the navigable channel has a width of 400 yards only. From Gala Island, on which there is a village, 3 miles above the entrance, the river takes a southwesterly direction for about 3 miles, where there are several branches. Mtali, the principal one, is navigable, at about half tide, for vessels of from 6 to 8 feet draft for about 10 miles. At 13 miles up it apparently ends in a swamp, as boats could not proceed beyond.

Banks.—Extending 850 yards from Ras Nando, the western point of entrance, is a sand bank which dries 4 feet at low water, and southward of this, on the same side, is Fungu Mbachiwonaki, a bank of coral and sand ½ mile in length, which dries at half ebb, and is connected with the sand bank from Ras Nando by a bar nearly dry at low water, over which there is a channel for small craft.

Bar—Depths.—From a short distance westward of Ras Rungi, a bar about 200 yards in width connects with the bank, of which Umtamar Shoal is the extreme, and on the bar there is said to be a depth of 17¾ feet at low water, spring tides, although from 13 to 15 feet have been reported, and it is not recommended that vessels above 20 feet should cross the bar without previous examination or the assistance of a pilot; within the bar the water deepens to from 7 to 10 fathoms at the anchorage off the town.

Beacons.—Two leading beacons stand a short distance northwestward of the town, the front beacon being a white obelisk, 16 feet high, on the beach; the rear beacon is a pole 30 feet high, with white triangular topmark. When in line from seaward, bearing 241°, they lead up to and just southward of the fairway buoy, but they are reported to be difficult to distinguish in the afternoon and evening, even in clear weather.

Buoys.—Two red spar buoys with white topmarks, A and B and A/Lindi and B/Lindi marked on them, are moored on the line of the leading beacons; the outer buoy, being the fairway buoy, is moored in 3 fathoms on the southeastern edge of the spit forming the northern side of the entrance. A similar buoy to the above, but with a topmark C and C/Lindi marked on it is moored in 2½ fathoms about ½ mile northeastward of the fort; it has a white board with

"5 meter" on it. The fact of these buoys being in position must not be depended on.

Directions.—To enter the river, steer in from seaward with the fort well open of Ras Rungi, bearing 228° until the leading beacons are nearly in line bearing 241° when keep slightly to the southward of this line, which leads northward of the reef off Mwentengi village and in the best water between Ras Rungi and the fairway buoy, passing about 100 yards southeastward of the latter.

Continue on this course and allowing for set of the tidal stream until the saddle between Mlima Nuni and Mlima Atu is in line with the middle of the entrance to the river bearing about 200° and altering course on this mark will lead to the anchorage off the town.

Anchorage.—The anchorage for vessels of moderate draft is in a depth of 9 fathoms, over sand and mud, northeastward of the town, with Ras Rungi bearing 170° and Lindi Fort 260°; there is a single baobab tree on Ras Rungi close to two houses.

Town.—The town of Lindi, built under a grove of coconut trees, has a fort, a customhouse, and other Government buildings, which lie near the shore, and there are landing steps near the customhouse; it has a small garrison and is the seat of a district controller. In 1908 the population was about 3,500, but there are very few Europeans.

Communication.—There is a weekly overland post to Mikindani and a land wire to Kilwa.

Supplies.—Fowls, eggs, and goats are to be obtained in small quantities, but vegetables are scarce; there are several wells of brackish water in Lindi, but good water is obtainable from a spring which passes under a turreted stone house on the eastern side of the river just inside the mangrove; at high water boats can go up this creek.

Trade.—European goods, hardware, etc., are imported and sent into the interior; the exports are ivory, brought to the coast by caravans, copal, caoutchouc, corn, rice, maize, and sesame. Nearly all trade is conducted by Banians, who are to be found at most places on this coast. For some miles round Lindi the country is well cultivated, rice, mtama seed, manioc, etc., being grown in abundance.

Coast.—Mto Mbanja, about 3 miles northward of Lindi Bay, may be known by a large gap in the hills, in which are two hills forming a landmark: there is no anchorage off it, but dhows enter at all times of tide, and within the mouth the water shoals to 3 feet.

Ras Kibungwe, 2 miles northward of Mbanja, is a wooded point, 50 feet high, and ½ mile northward of the point is an islet closely resembling it.

Ras Kera is a bold mangrove point, 4 miles northward of Ras Kibungwe, and Mto Kera is a small river immediately southward of Ras Kera. There are 4 fathoms between the reefs at the entrance to the river, but the mouth is so narrow that the swell caused by the surf on either side rolls in and makes it dangerous even for boats to enter.

Mchinga Bay (Port Nungwa), lying between Ras Mzinga and Ras Rokumbi, the former 10 feet and the latter 15 feet high and 2¾ miles apart, is about 1 mile wide between the fringing reefs when anchorage depths are reached, near its head. The bay may be known by the gap caused by Mto Namgaru at its head, and by the mangrove islets, from 12 to 15 feet high, on the fringing reefs extending from the entrance points. These reefs surround the entrance points and fringe both sides of the bay, extending from 800 to 1,500 yards offshore.

The entrance to Mto Namgaru, at the head of Mchinga Bay, is blocked by the Fungu Namtamwa, a drying bank, and is only passable by boats at high water. The river has not been explored, but it is stated that its waters were salt and that a canoe could ascend it in a three days' journey.

The 10-fathom contour line crosses the bay at about 1 mile from its head, and within it are depths of from 3¼ to 9 fathoms for a distance of about 900 yards to the 3-fathom contour.

Directions.—In entering Mchinga Bay, keep the entrance to Mto Namgaru bearing between 250° and 260°, but no soundings will be obtained with the hand lead until the tall mangroves on the southern shore bear 182°, when the depth suddenly decreases from 50 to 10 fathoms, after which anchor as convenient.

Anchorage.—There is anchorage on the southern side of Mchinga Bay in a depth of 3 fathoms, over sand, with Ras Mzinga bearing 120° and Ras Rokumbi 31°: here a vessel is partly sheltered by Mwamba Mahazamu from the swell which sets into the bay at all seasons. There is deeper water but less shelter northeastward of this position.

Tides.—It is high water, full and change, in Mchinga Bay at 4 h. 0 m.; springs rise 12 feet.

Town.—Mchinga town, with a customhouse, stands in the northwestern corner of the bay, in a coconut grove; Mchinga village is on the southern shore.

Coast.—Nondo and Ruvu Bays, both shallow indentations of the coast, afford no anchorage, as the water is deep close to the fringing reef, 600 or 800 yards wide, which borders the coast. There are no dangers outside the reef.

Mazungu Bay, 9 miles north-northwestward of Ruvu Bay, does not afford much shelter, though fair anchorage may be obtained in its southern part in 9 fathoms water, over sand and coral, with Ras Bwamkuro bearing 331° and the center of the village 211°. Mto Bwamkuro, discharging in the northern part of Mzungu Bay, discolors the water during the rainy season for 1 mile to seaward, and at low water a sand bank bars the entrance to the river to boats; on a rising tide there are heavy overfalls.

Kiswere Harbor is entered between Ras Bobare and Ras Berikiti, about ¾ mile apart, the channel being reduced to about ½ mile between coral reefs, dry at half tide, extending from these points. The bar of the Mto Nanga, with from 3 to 6 feet water, and with a patch on its eastern part awash at low water, springs, extends nearly 1 mile into the harbor on its northwestern side.

The approach is between Ras Bwamkuro, 20 feet high, and Ras Fughio, 29 feet high, 4½ miles apart, the most conspicuous features being Mlima Mamba, a conical wooded hill, 419 feet high, situated 1½ miles inland of the head of the harbor, and Mlima Ruhaha, 412 feet, about 2 miles northward of it, which has a high tree on it; on a nearer approach, Pandawi Square Cliff, on the coast, on the southwest side of the head, is conspicuous.

At a short distance from the coast the hills appear to be of moderate height, the tableland to the northward rising from 200 to 350 feet above the sea level. There are no dangers beyond the coral reefs fringing the shore.

The 10-fathom contour line crosses the bay between Ras Bobare and Berikiti, with a space of about 1,200 yards between it and the 3-fathom contour line, which is more than 1½ miles from the head, the latter drying out for nearly 800 yards.

Directions—Anchorage.—When approaching Kiswere Harbor, if toward low water, the sea will probably be observed breaking on the bank inside and on the coral reef off Ras Berikiti, which, when recognized, may be rounded as close as convenient.

Coming from the southward steer into the bay with Pandawi Cliff bearing 264° until abreast of Ras Berikiti, alter course to 247° until Mlima Ruhaha is seen between the entrance points of Mto Nanga, or, until the remarkable sand patch on the northern shore bears 2°, when a vessel may anchor in 4 fathoms, over stiff mud, and good holding ground, this being probably the best anchorage in either monsoon.

Deep draft vessels must anchor farther out, in about 12 fathoms, where they are more exposed.

A distant hill in line with a red cliff on the southwest side of the harbor, bearing about 244°, is also a mark for entering, but it is somewhat difficult to distinguish.

Tides.—It is high water, full and change, in Kiswere Harbor at 4 h. 25 m.; springs rise 12 feet.

Villages.—The large village of Kiswere, with a customhouse, is on the northwest side of Mto Kiswere, a small fresh-water stream running into the southwest corner of the bay, and can be reached by a boat at half tide; Mtumbo village is on the east side of the entrance to Mto Nanga.

Supplies of goats, fowls, eggs, etc., may be obtained at Kiswere village; the water in wells at Mtumbo village is brackish, and unfit for use.

Mto Nanga.—From the western entrance point of this river in the northwestern corner of Kiswere Harbor, a depth of 3 fathoms may be carried for 4½ miles, nearly up to the fork, but higher up the river becomes insignificant, and there is a patch of rocks in mid-channel 1 mile below the fork. The banks are mostly mangrove swamps, with higher, well wooded, and partially cultivated land in the background to the eastward.

The anchorage off Mtumbo village, in about 4 fathoms, is only accessible to light draft vessels, as the bar outside the entrance has only 6 feet over it at low water springs, and there is a nasty sea on it at times.

A good guide for entering is Mlima Ruhaha seen over the shore about ½ mile within the western entrance point, until Pandawi Cliff bears 233°; then edge toward the eastern and deeper side, and anchor as convenient off Mtumbo village.

Coast.—From Ras Fughio the coast trends nearly in a straight line for 9 miles, with sandy beaches and small off-lying mangrove islets on the reef, to Ras Mombi, the southern point of Roango Bay, a shallow indentation of the coast, not distinguishable above 3 miles off; the hills on this part of the coast are low and nearly all of the same height.

There is no anchorage for vessels, but a narrow 3-foot boat channel leads through the reef to a creek, affording shelter to dhows and situated in the center of the head of the bay. A village on the beach near the head of the bay is unapproachable to boats except at high water.

From Roango Bay the coast is rocky but with sandy bights as far as Ras Ngumbe Sukani, the highest point of this part of the coast, which may be known by being just southward of two islets, 20 feet high, close inshore on the fringing reef. If approached during the morning, a white patch will be seen on the upper part of the ras.

From Ras Ngumbe Sukani to Mto Pawi the coast consists of a mangrove swamp with several creeks, the mouths of which are not distinguishable from seaward. Between Kiswere Harbor and Mto Pawi the fringing reef is steep-to and extends from 600 to 800 yards offshore.

Mto Pawi, a boat channel available only at high tide with smooth water, separates the southern end of Songa Manara Island from the mainland and opens into Pawi Creek (Mkurulengamunyu), the southeastern arm of Sangarungu Harbor.

Mto Pawi is not distinguishable from seaward, being overhung by mangroves, but the south point of Songa Manara may be known by a remarkable break in one of the projecting cliffs, which, when seen from the southward, appears like an island. The sea, when there is much swell, breaks through this cleft with great violence, throwing the spray to a considerable height and giving the appearance of white smoke rising from the land.

Songa Manara Island, about 6 miles in length in a northwest and opposite direction, is low, with several groves of coconut trees on it and a particularly tall clump on Ras Kivurugu, its eastern extreme, which assists in recognizing it. The island has an indented rocky coast on its seaward side and is skirted by a reef, which extends nearly 1 mile off Ras Kivurugu. On its northeast side are the three low bushy Kivurugu Islets. The edge of the reef is everywhere steep-to.

There are several villages on Songa Manara Island, of which Sanjiya-Majoma is the principal; also the remains of stone houses and towers.

Sangarungu Harbor, lying within Songa Manara Island, is about 3 miles long by ½ mile wide in its eastern portion, with somewhat inconvenient depths for anchorage; the southern part is named Port Nisus, and Port Pactolus is the northern arm, which is exposed to the sea. The entrance, between Songa Manara and Kisiwa Kilwa, and common to both, is about ¾ mile wide between the reefs extending from either side.

Ras Sangarungu, the northern point of Songa Manara, on the southern side of the entrance, is sandy, crowned with high coconut trees and faced with mangroves. Ras Mchangamra, on the opposite side of the channel, is low and covered with mangroves.

Sangarungu Harbor is surrounded by mangroves and encumbered by islets and reefs, with strong tidal streams, and the swell reaches far in, so that a vessel would have to go some distance in for a secure berth. It has no proper rivers discharging into it, though many ramifications in the shape of mangrove creeks are used by the natives for local trade; but, Kilwa being so near, any trade from distant parts inland finds an exit there.

The depths in the entrance to the harbor are from 25 to 37 fathoms, and from 15 to 30 fathoms in the eastern arm extending to the southward.

Caution.—The water in Sangarungu Harbor is very thick and muddy; consequently, dangers can not be seen.

Port Nisus.—Sanji-ya-Kati, with a village on it, is a mangrove island nearly in the center of the southern branch of Sangarungu Harbor, with an extensive reef stretching northward from it. Southward of Sanji-ya-Kati is Port Nisus, affording anchorage.

The depths in the entrance to Port Nisus are from 6 to 11 fathoms and from 4 to 10 fathoms at the anchorage.

Port Pactolus.—The portion of the harbor northward of Sanji-ya-Kati Reef is Port Pactolus; its entrance is scarcely 200 yards wide between a sand spit with 3 fathoms water, extending northward from Sanji-ya-Kati Reef, and the shore reef southward of Kisiwa Kilwa. Within the entrance is good anchorage, over a muddy bottom, but exposed to the swell that rolls in through the wide open entrance to Sangarungu.

The depths in the entrance are from 4 to 10 fathoms and from 6 to 11 fathoms at the anchorage.

From this harbor there is boat communication at all times with Kilwa Harbor by Mlango Mugongo, the wide passage westward of Kisiwa Kilwa.

Kisiwa Kilwa, the island which separates the harbors of Sangarungu and Kilwa Kisiwani, is 3½ miles in length in a north and south direction, low, and covered with trees; the northern part is a coral plateau, 50 feet above the sea; on it are many large baobab trees. The fringing reef, drying off from 400 yards to 1 mile, and following the line of the east coast, is steep-to.

Kilwa Kisiwani Harbor is the eastern portion of an estuary, which extends inland for about 15 miles in a general westerly direction, to where the Mto Mavudyi discharges into it; it is adapted for steam vessels of all classes and for the shipment of goods. The entrance between Ras Kipakoni and Ras Matuso, about 2 miles apart, is about 800 yards wide between the reefs bordering the shore, which are steep-to, expanding to 1,200 or 1,400 yards inside near the town.

The estuary above Kilwa Kisiwani town, and known as Port Beaver, becomes shallow a few miles up, and then is divided by islands into channels leading to Mto Mavudyi, which has a depth of 2½ fathoms in its entrance, and is said to be navigable by canoes for some distance.

South shore—Ras Kipakoni, the southern point of entrance, is low, and has mangrove bushes on its western part; Mwamba Kipakoni, drying 5 feet, extends ¾ mile eastward of the point, and on its southeast edge is an islet, 12 feet high, while Balozi Spit extends ½ mile northward of Ras Kipakoni, and dries 7 feet; it and Mwamba Kipakoni are steep-to, the latter protecting the former from the sea, which only breaks on Balozi Spit at low water.

From Ras Kipakoni the southern shore to Ras Ruvura is of a cliffy nature and bordered by a narrow belt of mangroves, which also extend along the western ridge of Balozi Spit; the fringing reef on this shore is steep-to, and has on its northern edge, near its west extreme, Castle Islet, a mass of mangroves.

Beacon.—The north extreme of Balozi Spit is marked by an iron beacon, about 23 feet high, surmounted by a black ball.

North shore.—Ras Matuso (Cape Kilwa), the northern point of entrance, is low, sandy, and dotted with trees, and westward of it to Ras Mso the north shore is first sandy and then cliffy, Ras Mso being a cliff about 10 feet high.

Mwamba Rukyira, a tongue of reef stretching nearly 4 miles from Ras Matuso in a northeasterly direction, is prolonged as Rukyira Spit in a northerly direction, its total distance being 5½ miles; although Rukyira Spit is again prolonged for many miles to the northward by Rukyira Bar.

Southward and westward of Ras Matuso, the reef, extending from 1,000 to 1,300 yards offshore, is all dry at low water, springs, and there are mangrove bushes and sand banks on its eastern part, some above high water; it is steep-to on its southern and eastern sides, and the sea always breaks on it.

Mso Bay, between Ras Mso and Ras Rongozi, is shallow, its sandy shore terminating abruptly southward in low rocky cliffs, showing in one part a yellow face; southward of these cliffs to Ras Rongozi, and round into the harbor the shore is fringed with mangroves. A sand and mud bank, dry at low water, extends 300 yards southwestward from Ras Rongozi, with tidal whirls off it.

The base of Mpara Hill, a flat-topped eminence, 460 feet high, partially cultivated but mostly covered with jungle, skirts the northern shore of Port Beaver, which anchorage has ample width, and, for a distance of some 5 or 6 miles, is capable of receiving and giving perfect shelter to a number of vessels of the deepest draft.

Depth.—The depths in the entrance to Kilwa Kisiwani Harbor are from 10 to 44 fathoms, and from 10 to 20 fathoms at the anchorage; the entrance to Port Beaver has from 12 to 27 fathoms, decreasing to from 6 to 15 fathoms in the port.

Ferries.—The channel separating Kisiwa Kilwa from the mainland to the westward is very shallow at its northern end, and at low tides fordable, and at this part a ferry communicates with the island, while another ferry plies between Kilwa Kisiwani village and a break in the mangroves northwestward of Ras Rongozi.

Directions.—In making Kilwa Kisiwani from any direction, Mpara Hill, the only eminence in the immediate vicinity, will be seen in clear weather from a distance of 20 miles; it is flat-topped and in no way remarkable, except from being near Singino Hill to the northward. Southward of Songa Manara Island are other hills rather similar in appearance, but they are continuous, whereas southward of Mpara is a low plain forming a break of 20 miles.

In very clear weather the Mchinga Range, 1,200 feet above the sea and 20 miles inland, will also be seen, but the summits are not well marked. Ras Matuso is tolerably conspicuous, either from northward or southward, and Mwamba Rukyira, the reef off it, will be seen from a distance of 3 miles either dry or breaking.

At low water no other guide but the eye is necessary for entering the harbor, but at high water only the outer parts break, and Balozi Spit does not show even by a ripple, but the beacon on its northern extreme points out its position. A stranger should, if possible, avoid entering with the strength of the in-going stream and with the sun ahead, and with the outgoing stream running, the rush of water sometimes raises a sea between the outer points of the reefs, which, at springs, is dangerous for boats, and makes it difficult to realize that there are over 30 fathoms where the overfalls take place.

To enter from the northward, run along about ½ mile distant from the southeastern edge of Mwamba Rukyira, and the yellow cliffs on the southwest side of Mso Bay, said to be visible from a distance of 7 miles, being distinguished, they should be steered for bearing 285° which will lead in the middle of the fairway and northward of Balozi Spit beacon, which is sometimes difficult to distinguish against the dark background.

A baobab tree, standing in an open, park-like space, 45 feet high, is situated ½ mile eastward of Kilwa Kisiwani village, and painted black and white, but it is difficult to distinguish in a bad light; when Balozi Spit Beacon is passed, steer for the tree bearing 227°, until abreast of the mangrove bushes on Ras Rongozi, when alter course for the anchorage. While steering the above courses, the set of the tidal streams should be watched.

From the southward Ras Matuso should be approached bearing about 296° and the above directions followed. No reliance should be placed on positions obtained by bearings of points, formed by mangrove bushes, as the growth of these may have considerably altered the points.

There is no difficulty in sailing out in the early morning with the land wind.

Anchorage.—There is temporary outer anchorage during the northeast monsoon, about 400 yards from the southern edge of Mwamba Rukyira, in about 10 fathoms, over sand, abreast of the large mangrove bush on that reef, and 1,700 yards southward of Ras Matuso; the farther eastward the better, to be out of the rush of the tidal streams.

The anchorage northward of Kilwa Kisiwani village, in from 9 to 15 fathoms, is open to the sea breeze, but completely protected by the projecting points of reef from the heavy swell that almost invariably beats on the outer shore. A good berth is in a depth of 12 fathoms, with Castle Islet bearing 241°, the castle 202°, and Ras Kipakoni 90°. The reef dries off abreast nearly 400 yards.

Tides.—It is high water, full and change, at Kilwa Kisiwani at 3 h. 45 m.; springs rise 12 feet, neaps 7½ feet, neaps range 4 feet.

Tidal streams.—The tidal streams are strong, and at the inner anchorage there is often an eddy, but as the bottom is tenacious mud a vessel can lie with a short scope of cable and the anchor be kept clear.

Current—Caution.—The current is continuously north-going off all this part of the coast and frequently sets in toward the land; it is strongest and most regular during the southern monsoon, when its strength increases at times to 4 knots. Sailing vessels should therefore make the land southward of the desired point, and, if closing with it at night, heave-to in ample time to allow for drift.

Village.—Kilwa Kisiwani, so named in contradistinction to Kilwa Kivinje, a few miles to the northward, is the village occupying the site of the old Portuguese town of Quiloa, which was for several centuries the most important place on the east coast of Africa. The ruins of Old Quiloa, on the northwestern portion of the island, are extensive, but are mere foundations, except the ancient Arab Castle, a tall conspicuous keep-like fortress, which stands close to the water and may be seen from a distance of 10 miles in the morning sun, some mosques, and an embattled space, the walls of which are still standing.

The village of Kilwa Kisiwani has but little trade, what there is being in the hands of Banians.

Supplies.—Cattle, goats, and fowls are fairly plentiful, and the island abounds with bush buck; the inhabitants of Kisiwa Kilwa Island are supplied with water from wells.

Climate.—The harbor is mostly bordered by mangroves and has a bad reputation for malaria, but it is no worse than Kilwa Kivinje, and were the site of the dwelling houses as a rule better chosen it would be more healthy.

Winds.—Easterly winds prevail here in the form of strong sea breezes during the greater part of the year and generally occasion a considerable swell outside the harbor, so that if the wind falls light it is sometimes difficult for a sailing vessel to work out, which fact gives importance to the outer anchorage mentioned, that being the only position where a vessel can possibly bring up outside the harbor. The land wind blows early in the morning.

Coast.—From Ras Matuso the coast, trending in a north-northwest direction for 7 miles to Ras Tikwiri, is bordered by a reef which dries off from ½ to 1 mile, being a continuation of Mwamba Rukyira.

The coast is sandy and flat, with several villages, backed by thick jungle.

Rukyira Bay, between Ras Matuso and Ras Tikwiri, has good anchorage at its southern end, where Mwamba Rukyira protects a vessel from the swell, but is of little use, except to vessels of light draft, in consequence of Rukyira bar blocking the entrance from seaward.

Rukyira Bar, a continuation of Rukyira Spit, is narrow, about 5 miles distant from the coast and extends 9 miles northward, with irregular depths of from 2 to 10 fathoms, and less in one or more spots. Though there are doubtless places where vessels can at all times pass over it into Rukyira Bay, the attempt should not be made without good cause, as there is usually a heavy swell, and from the irregularity of the bottom other shoal spots, besides those marked on the chart, may exist.

Coast.—Ras Tikwiri (Kilwa Point) is formed of mangroves broken at its extreme into isolated clumps of these trees, which extend to about 600 yards within the edge of the fringing shore reef. Ruangale Reef (Dupont Bank) is dry 7 feet at low water, springs, and separated by a boat channel from the fringing reef; the sea always breaks on its outer edge, which lies 2½ miles eastward of Ras Tikwiri.

Ras Miramba is a low mangrove point, 6 miles northwestward of Ras Tikwiri, with shallow water extending 1¼ miles north-northeastward of it; northwestard of Ras Miramba the coast forms a shallow bay as far as Mto Gingwera Entrance, a distance of 3½ miles. On the shore of this bay is the large town of Kilwa Kivinje, presently described.

Singino hill, about 3 miles southwestward of Ras Miramba, is a flat cultivated plateau, 550 feet high, about 3 miles in diameter, and its rim or edge, being tolerably steep on all sides, serves for bearings. Nunguruku, a small conical hill 480 feet high, and connected to it by a low spur, is about 2 miles westward, in which direction other hills stretch, but the general prospect toward them is flat and uninteresting.

Mto Gingwera, the bar of which dries at low water, spring tides, can be ascended for a distance of about 9 miles, and abounds in hippopotami.

Reefs.—Mpovi Reef, 2½ miles in length in a northwest and opposite direction, and tolerably steep-to on its eastern edge, near which are a few mangrove bushes, has a sand bank which dries from 4 to 11 feet on it, and is the southernmost of the mass of reefs protecting the anchorage of Kilwa Kivinje. On its other sides the reef shelves gradually, but shoal water, under 3 fathoms, extends 1½ miles northward of the reef; although 1¼ miles from the shore, the channel between is only available for vessels of light draft.

Buoy.—A black conical buoy, marked "1, Kilwa," is moored on the north extreme of the shoal water on the north side of the reef.

Mwanamkaya, forming the southern side of the Kilwa Main Pass or southern channel to Kilwa Kivinje, is a reef 2½ miles in length in a north-northwest and opposite direction, and situated about 2 miles northeastward of Mpovi Reef, with 8 fathoms water between. Near the northwestern corner of Mwanamkaya is a sand head, which only covers at springs, and patches of from 3 to 4 fathoms lie about 1 mile eastward of the southern part of the reef, being the extension northward of Rukyira Bar.

Amana, 1½ miles long in an east and west direction, lies westward of Mwanamkaya, the sand on its western end drying 7 feet at half tide. There is a clear passage round it with nothing less than 4 fathoms.

Fanjove Island, on the north side of the entrance to Kilwa Pass, is small, covered with trees, and lies on the inner side of the northern portion of a reef 5½ miles in length in a north and south direction; its outer edge, on which the sea always breaks, being steep-to and drying 4 feet.

Shoal water, under 3 fathoms, extends 1,200 yards southwestward of the reef, and a detached patch of 3 fathoms lies nearly 1 mile westward of the south end of the reef.

Light.—On the southwest end of Fanjove Island is a white quadrangular tower 62 feet in height, which exhibits at an elevation of 66 feet above high water a fixed white light, visible 14 miles. A dwelling is attached to the lighthouse. For bearings of arc of visibility, see Light List.

Shoal.—A coral rock with a depth of 1 fathom over it has been discovered 1.3 miles 237° from Fanjove Island Lighthouse.

Luala, 2¼ miles westward of the southern portion of Fanjove Reef, is 2 miles in length in a north and south direction and has a sand bank which dries 6 feet on its northwest edge.

Jewe, a reef 3 miles in length in a northeast and opposite direction, and steep-to on all sides, lies 1¾ miles westward of Luala, separated by Luala Channel, which is deep and useful to vessels proceeding within the reefs, and not touching at Kilwa Kivinje; a long, narrow strip of sand on the northwest side of Jewe dries 11 feet, having no particular head. A 5-fathom patch lies 2 miles northward of the east end of Jewe Reef.

Kilwa Main Pass, between Mwanamkaya and Amana, on the south, and Fanjove Reef, Luala, and Jewe, on the north, is 2½ miles wide at its narrowest part.

Depths over 100 fathoms extend into the pass as far as a line joining the north end of Mwanamkaya and the northeast end of Jewe, from which they decrease gradually to the 10-fathom contour line, about 2½ miles from Kilwa Kivinje; the water becomes discolored when within the outer reefs.

Directions.—Approaching Kilwa Main Pass, Fanjove and the larger island of Songa Songa may be seen in clear weather from a distance of 14 miles, and Singino and Mpara Hills, under similar conditions, from 18 to 20 miles, but southward of the latter hill nothing will be visible unless in very clear weather, when the distant Mchinga Hills might perhaps be seen.

Steering to pass about 5 miles to the southward of Fanjove Island the breakers on the reef extending southward of it will be seen, and the eye will then be the best guide, giving the reef with the shoal water extending from it a berth of at least ½ mile.

When Fanjove Lighthouse bears 15°, if the weather is clear and the sun not ahead, the entrance to Mto Gingwera will probably be seen, showing as a slight gap in the coast line, when its center should be steered for, bearing 251°, until the western end of Jewe Reef bears 357°, when alter course for the anchorage off the town.

If the mouth of the river can not be distinguished when to the southward of Fanjove Reef, bearings of Fanjove Lighthouse and Singino (tangents) and Nunguruku Hills should fix the position, and a course may then be shaped for the river and anchorage, the most conspicuous objects being a white stone building with a red roof and a large white house, both on the beach; approaching the anchorage, the depth should not be shoaled to less than 5 fathoms.

Anchorage.—The anchorage is open, but good protection is afforded by the reefs to the eastward in ordinary weather, although when the monsoon is strong a slight swell comes in through the passages.

The bank of sand and mud fronting Ras Miramba and the town is about 1½ miles off to the 3-fathom contour line, and is reported to be extending to the northward of the latter, while off Mto Gingwera the similar bank is extending eastward, with two rocks, on which the depth is less than 6 feet, lying 2¼ and 2$\frac{4}{10}$ miles, respectively, from the northern point of entrance to that river.

A good berth in 4½ fathoms may be obtained by steering 198° for the station house, a white building with a red roof and a tower with a superstructure, until Nunguruku bears about 224°.

Buoy.—A red conical buoy, with a white tablet, on which is "4.5 m.," as a topmark, indicating the depth of 2½ fathoms in which it lies, is moored to the northward of the station house.

Tides.—It is high water, full and change, at Kilwa Kivinje, at 4 h. 0 m.; springs rise 12 feet.

The tidal streams at the anchorage are inappreciable.

Town.—The town of Kilwa Kivinje, 1 mile westward of Ras Miramba and partly surrounded by coconut palms, consists of a labyrinth of huts and brick houses, with a population of about 4,500 in 1908; it is the residence of a district controller, and has probably more trade than any other place in German East Africa.

Communication.—The port is in telegraphic communication with Dar es Salaam.

Supplies of cattle, sheep, poultry, and eggs are abundant, but excepting millet, manioc, and sweet potatoes, vegetables are not easily procured; water is obtainable, but that from wells in the town is bad.

Trade.—The exports consist chiefly of copal, coconuts, caoutchouc, corn, rice, maize, matting, etc., and imports stuffs and the necesarry articles for the native population.

Coast.—From Mto Gingwera the coast trends in a north-northwest direction, with some slight sinuosities and points to Ras Samanga Fungu, a distance of 18 miles, and for about the first 7 miles the shore is a sandy beach, but farther on it is fringed with mangroves. Villages lie all along this coast, but are mostly concealed by the mangroves. There are no reefs, except off Ras Wango, but a sand and mud flat dries off to a considerable distance.

The coast is backed by a flat plain, which to the northward gradually slopes upward to a number of low wooded ridges running parallel with the coast, which again rise to the Matumbi Range, 17 miles from the sea, and averaging from 1,700 to 2,200 feet in height.

Ras Samanga Fungu is a point of high mangroves conspicuous from the northward when near the coast, and close northward of it is Samanga Fungu Creek and village, with Samanga village about 1¾ miles farther northward, on the northern side of an estuary; it is the largest village between Kilwa Kivinje and the River Rufiji, and quite concealed from the sea.

The estuary contracts at a short distance inland and is said to join another creek which debouches about 1 mile northward of it and just southward of Ras Ndumbo, which is a mangrove point with a single bush on it.

Communication.—A telegraph office is situated at Mtingi on the coast, about 13 miles northward of Kilwa Kivinje.

Outer islands and reefs—Clearing mark.—Fanjove Island Lighthouse, or the light in sight at night, bearing westward of 192°, leads seaward of the reefs northward of Fanjove Island and its reefs.

Songa Songa Island, nearly 3½ miles northwestward of Fanjove Island, is a coral island 2½ miles in length, covered with trees, and situated on a broad reef, dry at spring tides, which is surrounded by shallow water on all but the northwestern side, where Pumbavu, a sandy islet with a few scattered trees, is connected with the main island by a neck of sand which covers ½ mile in length but has deep and clear water westward of it. On the point of Songa Songa, nearest Pumbavu, is a clump of tall trees conspicuous from the inner channel.

Dangers.—Val Rock, with 6 feet least water and steep-to, lies 2½ miles southward of Pumbavu Islet and 1 mile from Songa Songa Island Reef; as the rock does not show it should be given a wide berth.

Pweza is a small reef lying 1½ miles northward of Luala Reef, with a small sand head dry 8 feet at low water, springs.

Anchorage.—There is anchorage in about 6 fathoms from 600 to 1,000 yards westward of Pumbavu Islet. Small craft can anchor in 4 fathoms, nearer Songa Songa and more sheltered, by passing over the sandy flat joining Pumbavu Islet with the reef southward of it in not less than 2 fathoms at low water.

Supplies.—Songa Songa has a village standing in a large clearing of the bush, about ½ mile from the beach on its eastern shore, and wells, with tolerably good water, are situated in the coral nearly in its center; these are difficult of access and best approached from the western side. Cattle and goats are bred on the island.

Imbi, a reef northward of Fanjove, is 2½ miles in length, with a sand head drying 7 feet at low water, springs; it is steep-to along its eastern edge, on which the sea breaks heavily. Its southern end is connected with the Fanjove Reef by coral banks with no more than 3 fathoms, except in one narrow 4-fathom channel, which has only been partially examined.

Msuaji, drying 1 foot, is near the extreme of a shoal extending nearly 3 miles westward of Imbi, and Sanders Rock, with 1¼ fathoms, is 1¾ miles westward of Msuaji; Baniani, a reef drying 10 feet, is nearly 2 miles northward of Sanders Rock.

Nyuni, a coral and sand islet with bushes, and a few casuarinas, 60 feet high, on its eastern side, which can be seen from a distance of 12 miles, lies about 4 miles northward of Imbi on the western side of a reef 3 miles in length, dry at low water, and steep-to on its seaward side. Turtle frequent this island, and also Okuza northward of it, from February to July.

Kimbore Reef, drying 7 feet, lies about 1 mile westward of Nyuni Islet, and 3-fathom patches lie about 2 miles south-southwestward and 3½ miles southwestward of Nyuni.

Nyuni Pass, between Imbi Reef and Nyuni Island Reef, affords access to the Inner Channel, but as no good leading mark can be given and the swell is heavy on the edge of the shallow water, the passage is not recommended.

The 100-fathom contour line extends into the pass as far as the western side of Imbi, from which the depths to the westward decrease to from 4 to 5 fathoms over a shoal, forming a bar. There is a passage to the northwestward, with from 6 to 9 fathoms.

Mombawaka, northward of Nyuni Reef, is a reef 1½ miles in extent at its seaward edge, having a small area awash at low water, the remainder having but a few feet over it; the sea generally breaks over the whole reef.

Okuza Island, 6 miles northward of Nyuni Island, is small, sandy, and covered with casuarinas, the highest of which, at the eastern end, are 90 feet in height, and can be seen about 14 miles in clear weather. The island is on the northwestern part of a reef, 3 miles in length in a north and south direction, which dries from 10 to 12 feet at low water, springs, is steep-to on its seaward side, and tolerably so on the other sides.

Between Okuza and the reefs southwestward of Kibondo Island is the wide and clear entrance of the South Mafia Channel.

Anchorage.—There is anchorage within Okuza Reef in from 7 to 12 fathoms; in the northeast monsoon, a berth well to the southwestward should be chosen to avoid the swell.

Inner Channel—Reefs.—Between the outer reefs and islands described and the mainland southward of Mto Rufiji ya Wake is an inner chain of reefs, which for the most part have navigable channels between them. The track recommended is marked by a pecked line on the plan, and is best navigable by vessels when the sun is in a favorable position for seeing the reefs, and with a good lookout aloft; the channel on either side of Pwajuu and Poiasi Reefs is equally good. The reefs bordering this inner channel will now be described, commencing from the southward.

Buoyage.—A few of the most important shoals are marked by black conical buoys, with the number and name in white, moored on the eastern side of the channel, but their positions must not be entirely depended on.

Pwajuu Reef, lying in the fairway westward of Songa Songa Island, is 1½ miles in length with a long extent of sand drying 8 feet at half tide; it is mostly steep-to, and can generally be seen.

Poiasi Reef, also in the fairway, lies ¾ mile northward of Pwajuu Reef, and is 2½ miles long in a northwest and opposite direction by ½ mile wide, the narrow sand on it drying over an extent of 1½ miles, the highest part being at its northwest end, where it dries 11 feet at springs; it is mostly steep-to.

Eastern side.—**Machangi,** a mass of reefs on the eastern side of the best track, lies from 4½ to 7 miles northward of Songa Songa, its southwestern reef drying at half ebb; its edge is steep, but does not show well. The northwestern reef has a sand head near its western edge, drying 10 feet and covering only at high water, and except at that time is a good guide for the channel.

Banda, a small reef with a sand head drying 8 feet at low water, springs, is 2¼ miles northeastward from Machangi Sand Head; its western side is not steep-to.

Bawara, also on the eastern side of the best track, is another broken mass of reefs northeastward of Banda Reef, and covering an area 2½ miles in extent in a north and south, by 3 miles in an east and west direction, with four sand heads showing at low water; their western edges are fairly steep-to.

Western side.—Fungu Wango and Fungu Kiswasi, lying, respectively, eastward and northeastward of Ras Wango, dry 6 feet at low water, and are the southernmost reefs on this side.

Chocha is 2 miles in length in a northwest and southeast direction and dry at low water, with sand which dries 9 feet on its northwestern extreme; the southeastern end, which tails off for 400 yards and is about 1 mile westward of the sand head on Machangi, can generally be seen, showing green under water.

Membeuso, 2¾ miles northward of Machangi, is about 1 mile in length in a west-northwest and opposite direction by half that width; the sand on it dries 8 feet, and its edge is steep-to. A patch dries between it and Chocha, as does also Miza Reef, farther westward, and both are away from the best track.

Simaya Island, 4 miles northward of Membeuso Reef, is a sandy islet covered with high trees, which reach a height of 100 feet, and is visible 14 miles; it stands on a reef 1,400 or 1,600 yards long and steep-to. Some 5-fathom patches are charted between Simaya Island and Bawara Reefs, eastward of the best track.

Directions.—After leaving Kilwa Kivinje, the eastern edge of Singino Hill should be brought to bear 177° and a course 357° steered with it astern until the high trees at the northwest end of Songa Songa Island bear 28°, when alter course for them and continue until the discolored water of the southeast ends of Pwajuu and Poiasi Reefs is seen, when steer about 350° to pass ½ mile eastward of them and to the channel between Machangi and Chocha Reefs.

If passing westward of Pwajuu and Poiasi Reefs, and having steered 357° from Kilwa Kivinje, as before, when Songa Songa trees bear 28°, alter course to 347°, and when abreast the northwest end of Poiasi, alter course to 35° until nearly up to Machangi Reef. Chocha is not easily seen on account of its highest part being at the west end of the reef.

Having passed to the westward of northwest side of Machangi, steer 13° until 1½ miles eastward of Simaya Island, passing between Banda and Membeuso, and then shape a course 26° to pass nearly 1 mile westward of Mange.

Coast.—Mohoro Bay, included between Ras Ndumbo and Ras Pombwe, 5 miles apart, is fronted by a thick belt of mangroves along its shore, the bay drying about 2½ miles from its head at low water. Kikwaju is a broad but shallow creek in the northwestern part of the bay, and on the western shore, a short distance up this creek, is the village of Marendego.

Mto Mohoro, a river which eastward of Kikwaju Creek occupies the whole of the head of Mohoro Bay, flows into it by its two mouths, the Lokotonazi and Utagite Rivers; these are mangrove-lined creeks with from 1 fathom to 3 fathoms, and connect about 3 miles up. The Utagite has a depth of 3 feet on its bar at low water, springs, about 2 miles outside the entrance. There is no swell on the bar, but with any wind the sea breaks on the sand banks on either side at half ebb.

The Mohoro is 200 yards wide at the junction of the two rivers and at the highest point reached by the *Fawn's* boats, early in August, 1877, about 14 miles in a direct line from the coast, was 80 yards wide. At that distance it had become so shallow that the steam cutter could get no farther. Here are several villages with cultivated ground around. The land route from Kilwa to Dar es Salaam passes through them.

The banks of the river at that season are from 10 to 20 feet above water, and, where not scoured into cliffs by the stream, are densely covered with vegetation. The tidal influence extends above the villages.

Buoy.—A small black and red vertically striped can buoy marks the center of the fairway of the entrance to Utagite River.

Communication.—At Nebenzollamt, about 17 miles up the river from Ras Pombwe, is a post and a telegraph office.

Ras Pombwe (Bachambao), the northern point of Mohoro Bay, is composed of mangroves, and on its northeastern side is Pombwe Creek, nearly 1 mile wide in its entrance and extending about 2½ miles in a northwesterly direction from the ras, where it ends in a mangrove swamp.

Okambara is a reef of coral and mud stretching off 4½ miles in an east-southeast direction from Ras Pombwe and drying from 2 feet in its inner part to 8 feet in its outer part at low water, springs.

Northward of Okambara is Mwamba Mkuu, another large reef, which also dries 8 feet. It approaches within 1 mile of Simaya Island and there is a clear 7-fathom channel between them.

Kitope Hill, a conspicuous flat-topped hill, 780 feet high, rising in the plain 5 miles westward of Mohoro Bay, is thickly wooded, and has a lower spur to the northward with a small conical summit.

Rufiji Delta.—In Mohoro Bay, northward of Samanga, commences the remarkable maze of creeks forming the delta of the Rufiji, some of which do not communicate at ordinary times with either river, neither do the rivers themselves ever join, though at one point in their courses they approach one another closely. In the rainy season of the interior, December and the two following months, the whole plain is frequently flooded.

The delta has been pushed forward in advance of the general coastline and now forms a convex projection 50 miles in length, all low and of uniform outline, as viewed from the sea, with mangroves occupying the greatest portion of the shore line and extending back for a varying distance from it. Within the swampy belt is a broad flat plain, about 35 miles in length north and south, covered with long grass and a few trees, and dotted here and there with small villages, in the vicinity of which and near the rivers the land is cultivated.

From Ras Pombwe to Kikunguni village, 36 miles to the northward in a direct line, 10 large mouths open into the sea, eight of which are connected at all times with the Rufiji, the other two being only salt-water creeks. All these mouths are connected by a series of small creeks, passing through the mangroves near the sea, which serve, at high water, as canoe channels from one village to another without the necessity of crossing the bars, the absence of which at the Simba Uranga and Kikunya mouths render them the best entrances if wishing to ascend the Rufiji.

Mto Rufiji-ya-Wake (Kiengieni) connects with the main stream near Ruanda village, about 12 miles above Yaya Mouth, and has several branches probably leading northward and southward into adjacent entrances but all unexplored. The upper part is too shallow to allow a boat to reach the Rufiji in the dry season.

The bar, 1½ miles outside the entrance points, is never quite dry, but usually has some swell on it, and from 2 to 4 miles off it are several patches, awash at low water, with from 6 to 7 fathoms close-to. Yaya village, on its northern entrance point, stands in a clump of high trees.

Bumbura, the next creek to the northward, has not been explored, the sea breaking so heavily on the bar that it could not be crossed.

Ndahi Mouth, 7½ miles north-northeastward of Yaya Entrance, may possibly be distinguished by a high grove of cascuarinas on its northern bank, but the bar is bad at all times, owing to the sea rolling in through the wide South Mafia Channel.

Kiassi Mouth, 5½ miles northeastward of the Ndahi, is a broad arm, joining the latter at 5 miles to the southwestward, above which it takes the name of Mto Kimero, and winds through open grass country. About 6 miles up, it is joined by the Mto Usembe, which leaves the Rufiji 3 miles below the Mto Kimero, neither river affording a passage for even a small steam launch in the dry season, unless perhaps at spring tides.

Msala Mouth, situated westward of Boydu Island, may be considered the true mouth of the Rufiji, although one of the smallest, as firm ground and fresh water are much sooner reached by it than by the larger mangrove entrances. Banks of sand and mud dry off Msala Mouth for 3 miles, and, at low water, springs, the entrance is impracticable; there is considerable swell on the bar with a fresh breeze.

Immediately within the mouth is a large creek trending southward, with the village of Msala on its western point, and at 5 miles from the entrance to the Bumba Branch, or main stream, the mangrove belt is passed, while for 7 miles farther the river is bordered by dense forest, in which are rice clearings; at the point where it branches, and where the Rufiji proper is reached, it emerges into open country. Its average breadth is from 80 to 150 yards, with a depth of 2 fathoms.

Ras Twana, the northeastern point of the delta, is composed of low mangroves, and is 6 miles northward of the Msala Mouth; it has a sand and mud bank drying in spots at low water, springs, and tolerably steep-to, extending 3½ miles eastward, which is generally visible only when the sea is breaking on it. Twana Creek, close westward of the ras, is a blind creek.

Kiomboni Mouth, lying 2 miles northwestward from Ras Twana, is one of the large mouths of the Rufiji, and before joining the Simba Uranga, it runs for 12 miles through dense mangroves; it is about 400 yards wide, with a depth of from 3 feet to 3 fathoms.

Simba Uranga, used by coasting vessels which load with timber for Zanzibar, has practically no bar, being approached over the shore bank, under 3 fathoms, which extends 6 or 7 miles off its entrance; near low water, a considerable sea is sometimes raised by the ebb tide.

Patches, awash at low water, lie on the shore bank from 2 to 4 miles northeastward of the southern point of entrance.

Depths.—Within the 3-fathom contour line the depth decreases to 2 fathoms near the fairway buoy, and to 1½ fathoms near the inner buoy, the least depth being about 8 feet at low water, springs, and in the entrance to the river the depths are from 2 to 5 fathoms, while inside it deepens to 10 fathoms for a short distance.

Directions.—A conspicuous clump of high, ragged trees, situated a short distance northwestward of the mouth, is usually the first object seen when making the river, and the point on the south side has some high casuarina trees on it. A course 205° will lead to the center of the entrance, and within, the estuary is from 300 to 400 yards wide, and carries from 1 fathom to 3 fathoms to its junction with the Kiomboni, 10 miles to the southwestward. Several creeks branching off to the northward communicate with the Kikunya Branch.

Immediately inside the entrance, the large and intricate ramifications of the Suninga Branch trend away southward and rejoin the Simba Uranga 8½ miles to the southwestward, the courses of both being entirely through mangroves, and on the island thus formed is Suninga village, the largest of several in the rivers.

Kikunya Mouth, the northernmost and largest of these great openings, situated 3 miles northwestward of Simba Uranga, is 2½ miles wide at the entrance, and has no bar, the least depth being 2 fathoms at low water, springs, steering about 223° for the center of the entrance. Kikunya village, standing on firm land near the head of a little branch creek, 9 miles from the coast, is the most important place in the neighborhood.

The passage of the river presents no difficulties until within 2 miles of Kikunya, where the river becomes narrow, with sharp bends, and only about 3 feet at half tide. At the landing place, 1 mile below the village, there is a deep pool with from 4 to 6 fathoms water.

The Kikunya is only connected with the Rufiji by side communications with the Simba Uranga, and has no fresh water in it. In all the branches northward of Msala, the water is salt, as the amount of fresh water which finds its way into them is so small compared with their vast area that it produces but little effect.

Rufiji River.—**Above the delta** the river is not nearly the size that might be expected from the number and width of its mouths, and the undoubted distance of its source, and by the time the inundation caused by the interior rains has subsided and the stream becomes reduced in strength so that a boat can ascend, the available water channel is very limited and obstructed by many shoals and banks; also wherever the river widens with a straight reach it is frequently shallow for its whole width.

The steam cutter of the British naval vessel *Fawn*, drawing 3 feet, ascended without difficulty, for 30 miles to Kisoma, which is 20 miles in a straight line from the Msala Mouth, having general depths of from 2 to 3 fathoms, and not less than from 9 to 10 feet water all the way, except at one spot a little above Ukema village, where there seemed to be no deep channel, but a bar with from 2 to 3 feet across the river, which would probably be cleared away by the next inundation.

At Mpembeno village, just below Kisoma, although the river bed was over 300 yards wide from bank to bank, the actual stream of water was not more than 80 yards wide, and mostly shallow, while from somewhat unreliable information it was gathered that higher up, the river was more encumbered with shoals; the banks of the river at this part were flat and uninteresting with few trees.

The river is tidal to near the fork of the Kimero, and above this the velocity of the stream was on an average 1¾ miles an hour.

At Mpembeno is the main ferry by which the land route from Kilwa to Dar es Salaam crosses the Rufiji, and grain, roots, and pumpkins are grown.

A steam pinnace drawing 5½ feet, and accompanied by a whale boat, entered the river by the Simba Uranga Mouth in May, 1892, and reached Korogero or Kungulio, which is within two days' journey of Kisake, a German station on the Kingani River, but has only a few huts.

The Pangani Falls, probably about 150 miles from the entrance, were visited on foot from Korogero, and the river there was found to be about 30 yards wide and the falls about 3 feet in height in the month of June, the river having fallen about that amount in a fortnight.

The Rufiji is apparently navigable to the falls at all seasons for vessels of about 2 feet draft, the depths in places being from 20 to 30 feet, but the channel is constantly shifting, as at Kilindi a bar, which just admitted the passage of the ship's steam launch, when ascending, was dry on the return some three weeks later, and the descent was made by a detour, rejoining the main branch lower down.

The rise of the river is about 15 feet, and it is lowest in November, as in the Zambezi, the characteristics of the two rivers being much the same; it was noticed that the river fell 4½ feet between the 9th and 23d of May. The tide ceases at Jobine-Jongo (Jongoni?).

Numbers of villages were seen, in some cases the houses being built on piles, where the localities were flooded at high river, but above Kooni, about 90 miles from the entrance, the left, or northern, bank only was inhabited, although below that place there were villages on both banks; near the villages, bananas, mangoes, and rice were plentiful, while wood (ebony) for fuel was abundant between Nyanda village and the Pangani Falls, except for a short distance.

Descending the Rufiji from Kungulio village in canoes between the 13th and 16th of March, 1896, inclusive, the journey occupying 28 hours to the Simba Uranga Mouth, not less than 6 feet water was obtained anywhere, but this was the season of high river.

Mafia Island, forming part of the German Protectorate, and lying eastward of the northern part of the delta of the Rufiji, from which it is separated by the Mafia Channel, is 27 miles in length, in a northeast and opposite direction; it is composed of coral, with an extreme width of 9 miles. Its coast is generally low, but it has a central rocky plateau from 70 to 100 feet in height, the trees on it rising to a height of 200 feet; its outline is devoid of any remarkable feature.

The island is much cut up by mangrove swamps and creeks, but a large part is fertile and cultivated with coconut trees, manioc, etc. The eastern side is cliffy and fringed by a narrow coral reef, steep-to, on which the sea breaks furiously. The southern and western coasts are bordered by fringing reefs of varying width, and have numerous shoals off them.

The most considerable village is on Chole Island, in Chole Bay, on the southeastern side of Mafia; other villages, though numerous, are all very small.

Southeast coast.—Tutia Reef, the southernmost danger off Mafia, is detached and lies off the extreme of the reef extending 4½ miles southwestward of Kibondo Island. A sand bank on the northwestern part of Tutia Reef dries 12 feet at springs, and the southern edge of the reef breaks heavily, always showing its position; a rocky ridge on this edge also dries 12 feet, but being black is not so conspicuous.

Kibondo Island, triangular in shape, flat, and composed of coral, the sides being about 1¾ miles in length, lies 3¾ miles from the southern coast of Mafia Island, and has a clump of tall trees on the southern end, and some coconut palms on the northwestern point, which are both conspicuous.

The reef on which the island lies extends about 12 miles southwestward of Chole Bay, dries 8 feet at springs in places, and has Juani Island and some islets on it; its southeast edge is steep-to, and on it the sea breaks heavily.

Kibondo anchorage.—Good anchorage, sheltered from all swell, may be obtained on the west side of Kibondo Reef, a good berth being in a depth of 6 fathoms over sand and mud, with the southern islet of Kibondo bearing 88°, and the northwest end of Tutia Sand Bank 183°.

Caution.—It must be borne in mind that the sand bank is on the inner side of Tutia Reef, and a good berth should be given when rounding it for Kibondo anchorage from the eastward, as the current sets toward it.

Chole Bay, 4½ miles in diameter, is a deep indentation in the southeastern shore of Mafia Island, the mouth of which is nearly closed by the reefs and islands of Juani, Chole, and Miewi. Within the bay, which has only been partially examined, is a limited area of deep water, but Kinasi Pass, the entrance from the eastward, is narrow, with rocks on either side, and the tidal streams run with such velocity through it that unless well buoyed it would be unsafe for any vessel to use.

The southwest channel inside the reefs from the southwestward is always available for boats, except at low water, springs, and at high water small vessels of 10 feet draft can enter by it.

The depths in Kinasi Pass are from 6 to 11 fathoms and from 4 to 8 fathoms in the deep portion of the bay. The shores of Chole Bay are well cultivated and populated.

Juani Island, lying northeastward of Kibondo, on the same reef, and, forming the southern shore of Chole Bay, presents to seaward a straight face of cliffs 10 feet high and 4½ miles in length, fringed by a narrow reef; its inner coast is composed of cliffs and mangroves.

Chole Island, 1 mile in length, lies about ⅓ mile northwestward of Juani on the same reef, and on it is the principal village and place for trade in Mafia; it contains about 2,000 inhabitants and is locally celebrated for its mats, but it is difficult to communicate with, as a vessel can not get nearer than the anchorage westward of Kibondo, nearly 9 miles distant, and the water is so shallow between the anchorage and Chole that at low water springs it is not easy for even a light boat to find a passage.

Tides.—It is high water, full and change, in Chole Bay, at 4 h. 0 m.; springs rise 15 feet, neaps rise 10 feet.

Supplies of fresh provisions are scarce.

East coast.—From the southeast point of the island the east coast trends in a north-northeast direction for 18 miles to Ras Mkumbi, and is nearly straight and bordered by a steep-to fringing reef.

Mafia Island—South coast.—The southern coast of Mafia, from Chole Bay to Ras Kisimani, is low, mostly fringed with mangroves, and backed by groves of coconut trees, with the exception of some red cliffs, 60 feet high, westward of Dongo Jekundu, which are conspicuous. It is bordered by the Okuto Reef, dry in places at low watear, springs, and extending 3¾ miles southward, also by other shoal ground forming the northern side of Kibondo Anchorage.

Ras Mkumbi (Moresby Point), the northern extreme of Mafia Island, is a coral cliff about 15 feet high, within which the land, rising to about 80 feet, is covered with small bushes and trees.

Light.—A quadrangular-shaped tower, 98 feet in height, with red and white bands, stands on Ras Mkumbi, and exhibits, at an elevation of 102 feet above high water, a white and red alternating flashing light, visible 16 miles.

Reefs, on which the sea breaks in ordinary weather, extend 1,400 yards northward of Ras Mkumbi, and a 2-fathom patch lies 1 mile northeastward of the lighthouse, so that vessels should round the point at a distance of at least 1½ or 2 miles.

A tail of broken ground stretches 5 miles northward from Ras Mkumbi, and patches of 9 fathoms are found 5 or 6 miles northwestward of this tail near the edge of deep water; although the British naval vessel *Fawn* found nothing less than that depth it would be well to avoid the neighborhood. The rush of the current, even in places where the depth is not less than 20 fathoms, is plainly seen, and makes these patches appear like dangers.

Mafia Channel, between the dangers eastward of the northern mouths of the Rufiji River on the west and those westward and northwestward of Mafia Island on the east, although much encumbered by reefs, is buoyed and is easily navigable by day; it may be of considerable advantage to a steam vessel of moderate draft and low power proceeding to the southward against the southern monsoon, but vessels bound to the northward gain nothing by using it, as the current is favorable outside the island.

The best track, shown by a pecked line on the chart, is buoyed, the buoys being separately described with the dangers which they mark, and it is best to navigate it at low water when the reefs are most easily seen, but this can not always be depended on to the northward of the Rufiji Delta, where the water is frequently thick.

Too great reliance should not be placed on the buoys being in position.

Depths.—The least depth in Mafia Channel is 6 fathoms, unless passing westward of Sefo, when there is only from 4 to 5 fathoms.

West shore.—The west shore of Mafia Channel, formed by the land about the various northern outlets of the Rufiji River, has been described.

Dangers—West side.—Fungu Marima, the southernmost danger on the west side of the track, dries 4 feet, and is 2¾ miles in length in a north and south direction; a shoal with from 2 to 3 fathoms extends fully 1 mile southward, and shoal patches, one awash at low water, stretch about 5 miles to the northward of it, while the channel between it and the shore is almost filled by shoal patches.

Kauri, about 2¼ miles eastward of the north end of Fungu Marima, with shoal patches between, dries 6 feet.

Belami, about 2 miles north-northeastward of Kauri, is awash at low water, springs, at its northern part, situated 1½ miles west-southwestward of Ras Kisimani; a rocky shoal, partly detached, extends about 1½ miles to the southward, and there are patches in the channel to the westward.

Boydu Island, in the middle of that part of Mafia Channel westward of the track, is a narrow sandy island, 1½ miles in length in a west-northwest and opposite direction, and covered with casuarina trees 90 feet in height; it lies on a reef, drying from 2 to 6 feet, having islets on it southward of both extremes of the island, the reef extending from all sides and 2 miles to the southward. A shoal with from 1 to 3 fathoms extends nearly 4 miles north-northeastward of this reef.

Maduvi, a small sand bank drying 13 feet, lies 2 miles northeastward of the east end of Boydu Island, and from it a narrow shoal, with from 2 to 3 fathoms, stretches nearly 4 miles to the northward close along the western side of the track, being steep-to and generally showing by a line of discolored water.

East side.—Mange, southwestward of Okuto Reef and on the eastern side of the southern entrance to Mafia Channel, is 2 miles in length, dry at low water, springs, the sand head toward its northern end drying 12 feet; it can generally be distinguished even when the sand head is covered.

Buoy.—A black conical buoy, with "5, Mafia" in white letters on it, is moored in the western edge of the shore bank, with depths under 3 fathoms, which extends 1½ miles from the red cliffs, southward of Ras Kisimani; there is only 3 feet water a few yards eastward of the buoy, though it lies in 11 fathoms.

Ras Kisimani, the west point of Mafia Island, and the eastern point of entrance to the narrows of Mafia Channel, from the southward, is low, sandy, and steep-to at its western extreme, but shallow water extends from the coast both to the southward and northward of it; there is a swamp within the point.

Water may be obtained by digging holes in the sand to the northward of the point, but, although there is a village, supplies are difficult to procure.

Northwest coast.—Between Ras Kisimani and Ras Mbisi, 10 miles northeastward, the northwest coast of Mafia Island forms a bight named Tirene Bay, the land within its shores being about 100 feet high, and having two natural objects, forming useful landmarks.

Ngombeni Shamba, the southwestern of these, is a clump of mango trees, 175 feet high, about 2¾ miles eastward of Ras Kisimani, and showing more conspicuously than other lower clumps.

Palm Hill, 4 miles northeastward of this, and the other object, is covered with coconut palms, forming a conical summit 170 feet high, which shape is more marked at a distance, when it is more easily identified. Near Tirene, a plantation about 6½ miles northeastward of Ras Kisimani, there is a conspicuous white house.

Ras Mbisi, a coral point, has a mangrove creek on its southeast side, and on the land forming the west side of the creek are some high trees; the land rises at about 2 miles eastward to Lechmere Hill, 160 feet high.

Dangers—East side.—Al Hadjiri, a reef lying 3¼ miles northward of Ras Kisimani, is rather more than 1 mile in extent, with a sand bank on it that dries 6 feet at low water, springs, and is generally visible from discolored water; its southwest edge, toward Mafia Channel, not being steep-to, should be given a berth.

Buoy.—A black conical buoy, with "4 Mafia" in white letters on it, is moored on the west edge of the reef, west-southwestward of the drying sand bank.

Sefo, a reef about 3 miles northward of Al Hadjiri, has a sand bank on it, drying 12 feet at low water, springs, and is therefore generally visible.

Buoy.—A white spar buoy, with "Sefo" on it in white letters and surmounted by a staff and two triangles, bases apart, is moored on the west side of the sand bank.

Salim Bank, about 3 miles in length in a northwest and opposite direction, and 1¼ miles in greatest width, lies with its northwest end 1 mile eastward of Sefo; it is formed of sand and coral, and has a least depth of 1 fathom.

Buoy.—A black conical buoy, with "3 Mafia" in white letters on it, is moored at the northwest extreme of the bank.

Tirene Reef.—Sand dries off about 1½ miles from the shore of the bay northeastward of Ras Kisimani, about ½ mile off the shore northeastward, and 1¾ miles westward of Ras Mbisi, and outside it the shore bank, under 3 fathoms, extends in a tongue for nearly 5 miles northeastward of Ras Kisimani.

Tirene Reef, awash at low water, springs, lies about ½ mile northeastward of the point of this tongue of shore bank, and is steep-to on its southern side, but has shoal water extending from it about 1,600 yards to the northward, and 700 yards westward.

Buoys.—Tirene Reef is marked on its eastern side by a white spar buoy, with "Tirene" on it in white letters, and surmounted by two black triangles, bases together.

A red spar buoy, surmounted by a cylinder, is moored near the edge of the shore bank, northward of Kilindoni.

Directions.—From westward of Mange a course 4° should lead to about 800 yards westward of the black buoy ("5 Mafia"), when course may be altered to 348°, passing a similar distance westward of Ras Kisimani, and between the narrow bank, extending northward of Maduvi, on the west, and Al Hadjiri on the east.

Mange Reef can usually be seen from a distance of 2 miles, even when covered, which is only at or near high water, springs.

Being abreast the black buoy ("4 Mafia") marking the western edge of Al Harjiri and intending to anchor in Tirene Bay, continue the course 348° for about 1 mile, and then alter course to 27°, to pass about ½ mile westward of the black buoy ("3 Mafia") on the northwest extreme of Salim and, rounding that buoy, steer to the eastward until Magomani Shamba palm hill bears 164°, when steer for it, passing southwestward of the patch awash, situated 3 miles west-northwestward of Ras Mbisi, and eastward of the buoy marking Tirene Reef.

If not intending to enter Tirene Bay the course 348° may be continued, which should lead about 400 yards westward of the white spar buoy marking the northwest side of Sefo.

Anchorages.—Good anchorage may be obtained off Tirene, which has a conspicuous white house ¼ mile northward of it, in a depth of 6 fathoms, about ½ mile from the drying part of the shore sand and 1¼ miles offshore, with Ras Mbisi bearing 40°, sheltered by the outer banks; or a vessel might anchor farther southwestward off Kilindoni, abreast of a red buoy with "Kilindoni" in white letters on it, which has, as a topmark, a square tablet inscribed "4½ m.," indicating the depth of water in which it is moored.

Tidal streams.—From buoy "No. 3 Mafia" the stream of the rising tide sets somewhat strongly into Tirene Bay, and at the anchorage it was observed that the stream set to the northward at a rate of ½ knot at 3 hours after, and to the southward at a similar rate at the same time before, high water.

Village.—Kilindoni is a village with a customhouse.

Mafia Channel—West side—Dangers.—Wumi, the southernmost danger on the west side of the track continued northward of Sefo, is 6 miles north-northeastward of that reef, and dries 2 feet at low water, springs, but is not easily distinguished at high water on account of there being no sand on it; a 2-fathom patch lies 1 mile westward of it.

Fili, a reef drying 1 foot at low water, springs, is 4½ miles north-northeastward of Wumi, and of the same character as that danger, only smaller.

Dira, lying about 7 miles north-northwestward of Fili, is 3¼ miles in length in a north-northeast and opposite direction, with a sand bank drying 10 feet on its southwest side; it generally shows, and the sea always breaks on it. In a southeast direction, toward the track, are a number of patches with from 6 to 10 fathoms.

About 3 miles southwestward of the drying sand bank is the northern extreme of a reef about 1 mile in extent and awash at low water, springs, and a 5-fathom patch, with perhaps less water near it, is situated 1¾ miles east-northeastward of the northeast extreme of Dira.

A 2-fathom shoal and rock is located about 4½ miles southwestward of the southern extreme of Dira Reef. Depths of 2¼ fathoms have been found to extend about 1,200 yards 232° from this shoal, the approximate position of the latter being in latitude 7° 38′ south and longitude 39° 30′ 45″ east.

Ukamba, about 7 miles northward of Dira, has a sand bank near its northeast extreme, drying 10 feet at low water, springs, but on which the sea does not always break at high water, and from this sand bank the reef, with several drying patches and many breaks in them, extends about 3½ miles southwestward and upward of 4 miles westward; in the space south-southwestward of Ukamba, for 7 miles, are other reefs, mostly awash, with navigable channels between them, but lying out of the ordinary track of vessels.

The western detached reef of Ukamba is marked by a small barrel buoy, which is mentioned with the dangers off the western shore.

Muni Patches are three small coral heads, with 2 fathoms, occupying a space of about 4 miles in a north-northwest and opposite direction, the easternmost patch being situated nearly 4 miles eastward of Ukamba drying patch; they rise abruptly from deep water, their positions being only known by tidal swirls.

Bussard Reef, about 270 yards in extent, with less than 1 fathom over it, is about 2½ miles north-northwestward of the northeast extreme of Ukamba, and a patch of 2 fathoms lies about 1½ miles southeastward of Bussard Reef; the current runs strongly in the vicinity of the reef.

Field Patch, a small coral head of 5 fathoms, steep-to, is about 5 miles north-northeastward of the eastern Muni Patch.

Mafia Island—Northwest coast.—Kirongwe Bay, about 5 miles eastward of Ras Mbisi, is shallow, and choked with banks of mud and sand; the village of the same name lies at its head.

Ras Murundo, the northern point of entrance to Kirongwe Bay, is sandy, with high trees on it, and from the point Mwamba Kkuu stretches 2½ miles northwestward, its extreme drying 8 feet at low water, springs.

From Ras Murundo the coast, trending northeastward for about 11½ miles to Ras Mkumbi, is chiefly sandy, with low points of coral cliffs here and there, and some mangrove creeks, one of which, 4½ miles from Ras Murundo, joins Kirongwe Creek, and is generally frequented by hippopotami.

Anchorage.—During the southwest monsoon, when the wind is not too strong, there is good anchorage southwestward of Ras Mkumbi, in from 8 to 14 fathoms, over sand and mud, at from 1½ to 3 miles from the shore, a good berth, and convenient for landing, being in a depth of 9 fathoms, over sand and mud, with the lighthouse bearing 57° and Ras Bueni 117°, distant from 1 mile to 1¼ miles.

The edge of the fringing reef varies its distance from the shore near this anchorage from a few hundred yards to 1 mile, the edge, although not steep-to, being clearly seen at low water.

Landing.—The best landing at low water and at half tide is at Ras Bueni, where there is but little reef, but after half tide boats may land anywhere.

Supplies.—At several villages, southwestward of Ras Mkumbi, and at Bueni, bullocks, goats, fowls, and a small quantity of yams and pumpkins may be procured; guinea fowl are also obtainable.

Dangers—East side.—The southernmost danger on the east side of the track, northward of Tirene Bay, is the patch of reef already mentioned; on the north side of this patch, and to the eastward and northward, at a distance of about 2½ miles, are somewhat similar patches.

Barakuni Islet, about 6¼ miles north-northeastward of Ras Mbisi, is sandy and covered with casuarina trees, the tops of which are about 100 feet high; it lies on the southwest edge of a reef 1 mile in extent, from which a shallow spit extends 2 miles southwestward, leaving a narrow, but deep, channel between it and Mwamba Mkuu.

For a distance of about 3 miles northward of this reef and spit are a number of sunken reefs, separated by narrow channels; some of these reefs sometimes break heavily, whilst others do not show, but they practically close the passage except on the north side, and the tidal streams set through with considerable strength.

Pigeons may be obtained on Barakuni Islet as well as on Shungu-mbili.

Shungu-mbili Islet, 7 miles northward of Ras Mbisi, is similar to Barakuni Islet, and its trees, of the same height, may be seen from a distance of 14 miles in clear weather; it lies on the southern edge of a reef, which dries 3 feet at low water, springs. A spit, with depths under 10 fathoms, extends about 3 miles south-southwestward of the islet, and on it are two shallow patches, while shallow water, which is steep-to, extends 1¼ miles westward of the islet toward the track.

Buoy.—A black conical buoy, with "2 Mafia" on it in white letters, is moored at the western extreme of the latter shoal water.

Niororo Island, lying 5 miles northward of Shungu-mbili, is about ½ mile in length, covered with bushes, and has on it a few casuarina trees about 100 feet high; it is partly bordered by low coral cliff, and lies on the western edge of a drying reef, which is one of a number, separated from each other by shallow water, and stretching to the northward, southward, and eastward, for distances of from 1 mile to 3½ miles, but little more than 200 yards westward.

At the northwest extreme of the bank on which these reefs lie is a sand bank, drying 5 feet at low water, springs, and the current, being deflected to the northwestward by this part of the reef, often makes the reef to appear to extend farther in that direction than it actually does. A vessel approaching Mafia Channel from the northward will first sight Mafia Island, the trees on it being visible from about 14 miles.

Buoy.—A white spar buoy, surmounted by two black triangles, pointing downward, marks the southeast extreme of the bank on which the island and reefs stand.

Gordon Reef, a sunken danger with less than 1 fathom water, lies about 3 miles north-northeastward of Niororo Island, and about 4 miles east-southeastward of it is a patch of 3 fathoms, while Vulture Bank, 1½ miles in length, within the 10-fathom contour line, has one spot on its northeast end with a depth of 2 fathoms; it is situated about 6¼ miles northeastward of Niororo Island.

Fawn Bank, a number of patches, with depths of from 5 to 10 fathoms, lies, for a distance of 3½ miles, in an east and west direction across the northern entrance to Mafia Channel; its center is about 6¼ miles, 0°, of Niororo Island. Depths of from 4 to 7 fathoms are reported (1915) to exist within a distance of 4 miles to the northward of the eastern end of Fawn Bank.

Shungu-mbili just open westward of Niororo Island, bearing 178°, leads over Fawn Bank in a depth of 10 fathoms, and also westward of Gordon Reef.

Directions.—Having passed on either side of Sefo, Niororo Island should be steered for, bearing 27°, which course will lead about ¾ mile westward of the buoy marking the west end of Shungu-mbili Bank, and when Shungu-mbili Islet bears 142° alter course to 5° to pass westward of the buoy marking the northwest end of Niororo Island Bank.

Being abreast the latter buoy the course 27° should be again steered until Shungu-mbili is just open westward of Niororo Island, bearing 178°, when steer 358°, using these as a stern mark, and crossing Fawn Bank in a depth of 10 fathoms.

As previously mentioned, there is nothing to be gained by a vessel using this channel if bound to the northward, and a vessel coming from that direction must reverse these directions. A vessel from the northward from about 4 or 5 miles eastward of Ras Kanzi Lighthouse should steer about 174°, and the trees on Niororo Island should be seen in clear weather when abreast of Muni Patches, when the leading marks, already given, may be brought in line, but the outline of Mafia Island will not be visible until Shungu-mbili is abeam.

Anchorage, in a depth of 9 fathoms, over sand, may be obtained off the northwest end of Niororo Island, on which turtle may be procured in the season, from January to June, the natives coming in these months from the mainland to turn them.

Tides.—It is high water, full and change, at Ras Kisimani, and throughout the Mafia Channel, at 3 h. 55 m.; springs rise 15 feet, neaps rise 9 feet.

Tidal streams.—Southward of Ras Kisimani the stream of the rising tide sets northwestward, and the other stream in a contrary direction, but to the northward of Ras Kisimani the streams are nearly reversed, the former being a south-going stream and the latter northeast going, although the streams are frequently overpowered by the permanent north-going current, especially during neaps.

The alteration in the direction of the streams depends considerably on the wind, as if that should be strong from southeast, unless at spring tides, it is almost certain that a strong north-going current will be experienced in Mafia Channel, at any time of tide.

Between Mange and Sefo Reefs, the current or stream generally follows the direction of the channel, but a northeast-going set may be experienced, on passing Al Hadjiri, with a falling tide.

Coast.—From Kikunguni the coast, mostly sandy and fronted by a mud bank drying at low water, trends in a north-northeast direction, forming a long bight, for 33 miles, to Ras Pembamnasi; there are no important projections, but it is intersected by several streams, some of which have large mouths, all closed at low water, springs, but accessible to small vessels at high water.

About 6 miles within the coast the Mtoti Hills, a flat-topped range, runs parallel to it, and at its southern end is Kanage, 700 feet high, with a conspicuous clump of trees on it, from which the range lowers to 300 feet at its northern end. The country near the sea is well cultivated and thickly populated, and a considerable amount of copal and rubber is produced in the vicinity.

The most important of the several villages are Kavinja, 5 miles northward of Kikunguni; Kivumangao and Yandope, 7 and 8 miles farther north; Kisiju abreast of Kwale Island, and Bosa westward of Ras Pembamnasi.

Several small islands, with a number of dangers outside them, lie off the coast, most of the latter, on account of the muddy water, only showing at low tide, and both islands and reefs break with the ocean swell; but in ordinary weather and except in places abreast the channels between them, the water is smooth and landing may be easily effected.

The water deepens very gradually along the coast, with a navigable channel, having a soft muddy bottom inside the islands, the water being generally deeper toward them; this channel is invariably used by dhows.

Tidal streams and currents.—The tidal streams are strong in all the channels, and along the shore the stream of the rising tide running to the southward and toward, and the other stream to the northward and off, the shore. Eastward of the Kwale Reefs there is sometimes a continous northerly current, but this depends on the wind.

Islands and reefs.—**Koma Island,** formed of coral, and 1 mile in diameter, with the tops of the trees about 70 feet above high water, is 5 miles from the mainland, with from 3 to 4 fathoms in the channel between. The island stands on a reef extending 2 miles northeastward, having several small bush-covered islets on its outer part, the northernmost and largest being Pemba-juu, with trees 40 feet in height.

Hatambura, a rocky islet with trees about 40 feet in height, situated 2¾ miles northward of Koma, is surrounded by a narrow reef with 5 and 6 fathoms water close-to.

Anchorage.—Good anchorage in either monsoon may be obtained to the northward of Koma Island, in a depth of 6 fathoms, over mud, with Pemba-juu Islet bearing about 94°, distant 1,400 or 1,600 yards.

Supplies.—Bullocks, fowls, and goats are procurable at Koma at a cheap rate, and there is a well of good water easy of access near the western point.

Kwale Island, 7½ miles northward of Koma Island, is composed of coral, and 2½ miles long by 1,500 yards wide, the tops of the trees being about 100 feet above high water; it is bordered by a large reef, on the southeast side of which are the three bushy Chokaa Islets, the easternmost of these, 40 feet high, being 1 mile from Kwale. The narrow channel within Kwale Island has a maximum depth of 2 fathoms at low water, springs, over muddy bottom.

Buoy.—The northwestern edge of the sand bank extending from Ras Funguni, the west point of the island, is marked by a black conical buoy.

North Fanjove Island, 5½ miles northeastward of Kwale Island, is sandy, covered with trees 60 feet high, and surrounded by a reef, which extends about ¾ mile south-southwestward, and dries out to a distance of ½ mile in some other directions. Several patches of reef lie between it and Kwale Island.

Sukuti Reef, the northernmost and largest of Kwale Reefs, occupies a space between 2 and 5½ miles northward of North Fanjove Island, and is from 3 to 6 miles from the mainland; it forms the southern side of Shungu Bay. Two mangrove trees stand on its western side, where is also a coral head that dries 10 feet; the sea always breaks heavily on the outer edge of Sukuti Reef.

Vyumbani are three small reefs awash, about 2 miles southwestward from the shallowest parts of Sukuti Reef and 2½ miles from the mainland.

Channels.—The channel, 1½ miles wide, between North Fanjove Island and Sukuti Reef, has depths of from 6 to 12 fathoms, and the northern side of Mto Dendeni entrance, where there is a conspicuous high clump of trees, bearing 269°, leads through. A channel inside Sukuti and Vyumbani Reefs has 3 fathoms at low water, springs, but the latter reefs do not show at high water.

Anchorage.—Good anchorage may be obtained by small craft in either monsoon, in a depth of 3 or 4 fathoms, westward of Sukuti Reef and most easily entered from the northward. Binga Hill, isolated, flat-topped, and 530 feet high, situated 8 miles northwestward of Mto Dendini, is a conspicuous object from this anchorage.

Ras Pembamnasi, the eastern point of Shungu Bay, is a low mangrove point backed by higher trees, with shore reef drying off ½ mile; a detached breaking patch lies 1,400 yards from the eastern extreme, and a rock, awash at low water, is 1 mile west-southwestward of the point.

Shungu Bay, southwestward of Ras Pembamnasi, is shallow, the 3-fathom contour line being about 1½ miles offshore. Mto Shungubueni, discharging into the bay, is of considerable width at its mouth, which dries completely across at low water, springs, and has a rock, drying 6 feet, lying nearly 1 mile off it. A boat can ascend for several miles at high water.

Ras Mwambamku, formed of high mangroves, is bordered by a reef which dries off 1 mile southward, with a 3-fathom tail extending southwestward for another mile; a 2-fathom patch, ½ mile in extent, lies 2¼ miles south-southwestward from the point.

Buuni Bay, between Ras Pembamnasi and Ras Mwambamku, is a sandy bay 3 miles wide, mostly shallow, and open to the southeastward. Some red cliffs, a little southward of the village in the center of the bay, show well with the sun in the east.

Directions.—Approaching Buuni Bay from the southward the highest trees on Ras Pembamnasi should be steered for bearing 330°, until the eastern extreme of Ras Mwambamku bears 23°, when alter course for it, which will lead in a depth of 4½ fathoms between the 2-fathom patch 2¼ miles south-southwestward of Ras Mwambamku and the breaking reef off Ras Pembamnasi.

From the northward steer for the red cliffs bearing 319°, which will lead, in a depth of 5 fathoms, between the 2-fathom patch and the reef extending southwestward of Ras Mwambamku, and when the east extreme of that point bears 20°, alter course for it and the anchorage.

Anchorage.—The anchorage in Buuni Bay during the northeast monsoon is in a depth of 5½ fathoms, over sand and mud, with Ras Mwambamku bearing 20°, and the southern extreme of the reef extending from it 82°, protected by Ras Mwambamku.

Coast.—From Ras Mwambamku the coast trends to the northward for 7¼ miles to Ras Kanzi, the first 3 miles being low and swampy, after which it rises to cliffs, 80 feet high, at Puna Point, off which the shore reef extends only a few hundred yards, with deep water close-to, but in other places it stretches off nearly 1 mile.

Ras Kanzi may be distinguished by the number of palmyra palms near it, which are not seen elsewhere on this coast, also by Puna Hill, isolated, rounded, and 240 feet high, situated about 4¼ miles to the westward of it, and which is especially conspicuous when approaching from the southward.

Light.—A fixed white light, visible 14 miles, is exhibited, at an elevation of 62 feet above high water, from a quadrangular-shaped tower, 31 feet in height, situated on Ras Kanzi; a detached white dwelling is near the light tower. For bearings of arc of visibility, see Light List.

Currents.—The current to the eastward of Mafia Island runs continuously to the north-northwestward, its rate varying from 1 knot to 2 knots in the northeast monsoon to from 2 to 4 knots in the southwest monsoon, and the width of its belt also varies considerably, extending sometimes only about 30 miles offshore and at other times much more, so that it is difficult to estimate its velocity when approaching the coast from the eastward.

A vessel bound for Zanzibar should steer well to the southward to make Ras Mkumbi Lighthouse or Light, so as to insure giving the dangerous locality of Fungu Kizimkazi (Latham Island) a wide berth.

Northward of Ras Mkumbi the western limit of the current sometimes does not reach beyond midway between the mainland and Fungu Kizimkazi, and in such condition, even in the southern monsoon, a southerly set may be experienced near Ras Kimbiji, but usually at this season the current strikes the coast somewhere in the vicinity of Ras Kimbiji, and runs along it to the northward.

On the bank under 100 fathoms, northwestward of Ras Mkumbi, the movement of the water is tidal, the stream of the rising tide setting southwestward, and the other stream in an opposite direction, but varying several points either way.

Winds.—The seasons at Mafia Island are similar to those at Zanzibar and, like them, very changeable, but the wind in the Mafia Channel is steadier during the day than in the Zanzibar Channel. The rainfall is greater in the vicinity of Ras Kisimani than in other parts of Mafia Island.

CHAPTER IX.

RAS KANZI TO PANGANI BAY, INCLUDING ZANZIBAR ISLAND AND CHANNEL.

Fungu Kizimkazi (Latham Island), belonging to the Government of Zanzibar, is a low, dangerous coral island lying 77°, distant 23½ miles from Ras Kimbiji, and in the fairway of vessels approaching the Zanzibar Channel from the southeastward; it is 350 yards long in a north and south direction, and nearly 200 yards wide.

Its surface, 10 feet above high water, has been flattened by the constant treading of myriads of sea fowl, thus consolidating the sand collected on the coral substratum into a soft sandstone, which shines very white in the sun but is difficult to see with a bad light or at night. It lies on a coral ledge which dries for about 200 yards off it, and depths of less than 3 fathoms extend beyond about 600 yards northward and eastward, and about half that distance southward and westward.

Landing.—A sand bank shifts from one end of the island to the other, according to the monsoon, being always on the lee side, and on this it is practicable to effect a landing in moderately calm weather.

Beacon.—The base of a beacon, which marked the island, was reported to be in existence in 1899, with a small house having a corrugated iron roof and a flagstaff near it, but no reliance should be placed on finding these still standing.

Anchorage.—The island is near the western edge of a bank, which, within a depth of 20 fathoms, extends about 4½ miles to the northward, 4 miles to the southward, and 2 miles to the eastward, beyond which the water rapidly deepens to 200 fathoms. The greater part of the bank has depths of from 5 to 10 fathoms, over sand, interspersed with large lumps of coral, and the water is so clear that the bottom has been plainly seen by moonlight when in a depth of 10 fathoms.

Anchorage may be taken up to the northward or southward of the island, depending on the monsoon, and in moderate weather it is a good place for a vessel to anchor for the night when too late to fetch Zanzibar, at which time the bank may be safely approached by the lead on any side but the west, where it is steep-to, but the cross swell on the bank renders the anchorage uneasy.

From the masthead of a vessel at anchor the mainland at Ras Kimbiji is just visible on a clear day. There is good fishing on the bank.

Tides.—It is high water, full and change, at Fungu Kizimkazi at 4 h. 0 m.; springs rise about 12 feet.

Current.—The current on the bank is variable, but on either side of it, directly the deep water is gained, it runs to the northward with varying strength all the year round, the velocity during the southwest monsoon being from 1½ to 4 knots, and in the northeast monsoon from 1 knot to 2½ knots. At 5 miles westward of Fungu Kizimkazi the current is much weaker. In November, 1914, the British naval vessel *Chatham* experienced a set to the southeastward of about 1 knot per hour when passing inside Fungu Kizimkazi.

Coast.—**Ras Kimbiji**, a cliffy but low promontory on the mainland, about 1½ miles to the northward of Ras Kanzi, will be known by a rounded hill 150 feet high, conspicuous by its isolation, which rises 2 miles within the point, and by the lighthouse on Ras Kanzi; it is a good point for a fresh departure if bound up Zanzibar Channel.

The coast from Ras Kimbiji to Ras Manamku, 6¼ miles north-northwestward, is varied by cliffs and sandy bays, the land being higher than that for some distance to the northward; at the village of Kutani, about midway, the cliffs are 70 feet high and of a red color. Ras Manamku is a red cliffy point 60 feet high.

Fungu Miza, a narrow reef, 1 mile long and drying 1 foot at low water, springs, lies 1¼ miles off Kutani Cliff and village. A rock with less than 1 fathom, on which the sea generally breaks, lies nearly 1 mile north-northwestward of it, with shallow water between.

Anchorage.—Temporary anchorage in a depth of about 14 fathoms can be obtained about 1 mile offshore anywhere along this coast when the monsoon is light, except near Fungu Miza, but care must be taken not to approach the anchorage at too great a speed, as the depth decreases suddenly from 35 to 15 fathoms, and from that again to much shoaler water.

Ras Ndege, the southwest point of the southern entrance of the Zanzibar Channel, is cliffy, 30 feet high, and backed by low, rounded hills, being conspicuous from the southeastward or northwestward; it is abrupt, with cliffs 10 feet high, which are fairly steep-to.

Coasting craft working southward along the mainland meet the current off Ras Ndege, which makes it a difficult point to pass during the southwest monsoon; but there is good anchorage for small craft 1½ miles westward of the point.

Dhow Harbor.—From Ras Ndege, the coast trending for 5 miles in a west-northwest direction to Ras Koronjo, is generally a sandy beach, but there are some small cliffs; at about 1½ miles from the former point is a dhow harbor, a bight in the shore reef, affording anchorage in 2 fathoms during the southwest monsoon, at which season it and parts of the coast westward are usually frequented by dhows waiting to get around Ras Ndege.

Coast.—Ras Koronjo, a cliffy point, 4 miles from the dhow harbor, with Mboamaji village nearly midway between, has a fringing coral ledge drying out nearly 1 mile in a northwesterly direction from it; and between Ras Koronjo and Ras Mjimwema, 3 miles farther west-northwestward, the coast forms a low, sandy bay, backed by mangrove swamps, with the village of Mjimwema on its western shore. High coconut trees grow around the villages of Mjimwema, Mjimpia, and Magogoni.

Ras Rongoni, 2 miles northwestward of Ras Mjimwema, is the rocky eastern point of Dar es Salaam Harbor, the red cliffs of the point being from 15 to 20 feet high.

Beacons.—On Ras Rongoni stands a white obelisk, and on a rock 180 yards in front of it is a white pyramidal beacon, the two forming a leading mark for the approach to the entrance of the harbor.

Islands and reefs.—A little to the northwestward of Ras Ndege commences a chain of islands and reefs, which, skirting the coast for about 20 miles, as far as Fungu Yasin, afford shelter to several anchorages and lie at an average of 2 miles from the mainland, in addition to which is the landlocked harbor of Dar es Salaam.

Mwamba Kikwero, about ¾ mile in extent, and drying 2 feet at low water, springs, is steep-to, with from 6 to 9 fathoms around, and lies about 2 miles north-northeastward of Mboamaji village; between it and the shore reef is a patch, awash at low water, on which the sea always breaks.

A 3½-fathom patch lies 1,400 yards north-northeastward of Mwamba Kikwero.

Sinda Islands, between 1 and 2 miles northward of Ras Koronjo, are two coral islands on a reef 1 mile in diameter, the outer and larger island ½ mile long and about 50 feet high, with some trees on it; a chain of islets fringes the eastern edge of the reef. Inner Sinda Island, 40 feet high, has white sand on its northern and southern extremes.

Millard Bank, 1 mile in length, has a least depth of 3 fathoms on the shoalest spot, at the northern end, situated 1½ miles north-northwestward of Outer Sinda Island; the bank can not be distinguished until close to it. Gunja Peak in line with Ras Kankadya, bearing 287°, leads about 1½ miles northward of it.

Mboamaji Harbor, the anchorage, southwestward of the Sinda Islands, is fairly protected by the surrounding reefs, but in a strong monsoon, and especially the northeast monsoon, the swell sets in round the islands. Mboamaji village is on the shore southeastward of

Sinda Islands, a curve, in the coral ledge fronting it, affords protection to boats landing at low water.

Directions.—To enter Mboamaji Harbor from the southeastward, keep Inner Makatumbe Island well open northward of Outer Sinda Island, bearing 275°, which leads northward of the 3½-fathom patch, northward of Mwamba Kikwero, and when the Sinda Islands appear to touch, bearing about 256°, steer to pass about 600 yards off the islets on the eastern side of Sinda Reef; the eye will guide to the anchorage.

To enter from the northward, westward of Millard Bank; from abreast of the Makatumbe group, bring the southwestern point of Inner Sinda Island to bear 150°, and steer for it, anchoring when convenient.

Anchorage.—The best anchorage during the southwest monsoon is in a depth of 10 fathoms, over sand and mud, with the south extreme of Inner Sinda Island bearing 110°, and the north extreme of Outer Sinda 60°. There is also fair anchorage off Mjimwema village in 6 fathoms water, over sand, with the northeast extreme of Kendwa Island bearing 326°, and the white house in Mjimwema village, 241°.

Small vessels of 10 feet draft may obtain well-sheltered anchorage close off the village, the best berth in the northeast monsoon being in a depth of 6 fathoms, over sand, with the southwestern point of Inner Sinda bearing 17°, distant 400 yards.

Tidal streams.—The streams at this latter anchorage are strong, and toward high water, especially in the northeast monsoon, the stream runs rapidly eastward, and causes a vessel to swing to the swell in a most unpleasant manner.

Kendwa, an island ½ mile in extent, is on the edge of the coral ledge fronting Ras Mjimwema to a distance of 1 mile. Its trees are 40 feet above high water and its outline level and uniform.

Boat channel.—Between Kendwa Island and Makatumbe Reefs is a boat channel ½ mile wide, but even in the southwest monsoon, at low water, the sea sometimes breaks right across it. Working to windward in the northeast monsoon the lee of Makatumbe Island Reef should be kept.

Dar es Salaam Bay, the outer anchorage of Dar es Salaam, lies between the Makatumbe Group and Kankadya Peninsula, which extends to the northward on the west side. Its northern portion is encumbered by the Daphne Reefs, but there is sufficient space in the remainder for all classes of vessels. During the southwest monsoon the bay is well protected by the Makatumbe Group, but during the northeast monsoon a considerable swell sets in with a strong wind, although a small vessel which can lie near Inner Makatumbe Island will be somewhat sheltered.

The shore of the bay is broken and indented and presents to the eye a low outline, nearly uniform in height, but much diversified by alternate sand beaches and cliffs, while at about 12 miles inland a chain of mountains, rising to a height of from 1,200 to 1,500 feet, extends southwestward and terminates abruptly.

Makatumbe Islands, with several islets, lie on a large coral reef, 1¾ miles in length in a northwest and opposite direction, on the southeast side of Dar es Salaam Bay; the two largest islands are about 400 yards in extent, the outer, 40 feet high, being on the northeast and the inner on the southwest side of the reef. The inner island has several trees about 50 feet high near its center, and the quarantine station, a white house with a flagstaff on its southwest side. The water from a well on this island is undrinkable.

Light.—Half a mile eastward of the west extreme of Outer Makatumbe Island is a square tower, 95 feet high, with black and white stripes, which exhibits, at an elevation of 96 feet above high water, a flashing white light, visible 15 miles.

Dangers.—The reef on which Makatumbe Islands lie dries at low water, springs, is steep-to on its eastern side and connected to the shore southwestward of it by a shallow flat, having an average depth of 1½ fathoms.

Hammond Rock, the northernmost of the islets on the reef and immediately within its north end, is 6 feet high, and forms a guide to vessels rounding the reef; the extreme of a shoal with 2½ fathoms is 800 yards northwestward of Hammond Rock, and the 5-fathom contour line passes the same distance northward of that rock. The western edge of the reef slopes gradually.

Buoy.—A white spar buoy, with "Hammond" in black letters on it, and surmounted by two black triangles, is moored 800 yards northward of Hammond Rock, on the 5-fathom contour.

West shore.—From Ras Kankadya, the north extreme of the peninsula forming the west side of Dar es Salaam Bay, the west shore has a general southerly trend for 3¼ miles, with one small bay, to Upanga Bay, a sandy inlet ½ mile wide, with cliffy points, and drying at low water; Mto Upanga runs into its head.

The east shore of the peninsula has cliffs from 10 to 20 feet high and is fringed by a reef which, with shore bank, extends in places for 600 yards; seen from the northeastward, the peninsula appears as an island, and a sandy patch, about ¾ mile within its extreme, is conspicuous with the sun in the east.

From Upanga Bay, the head of Dar es Salaam Bay curves round to the southeastward and has shore reef, continued by shore bank under 3 fathoms, extending 1¼ miles out, the entrance to Dar es Salaam Harbor being between points of the reef.

Dangers.—Kankadya Patch, with a depth of 5 fathoms, lies 2¾ miles eastward of Ras Kankadya.

Daphne Reefs, lying toward the northwest side of the entrance to the bay, occupy a space 1½ miles in length in a northeast and opposite direction, the outermost and largest being 1 mile in length in a north-northwest and opposite direction, within the 5-fathom contour line, and has depths of from 2 to 2½ fathoms for a length of 1,400 yards; the shallowest part of 2 fathoms can sometimes be seen, but this should not be relied on.

The middle reef, ½ mile southwestward of the outermost, is about 1,200 yards in length in a north and south direction within the 5-fathom contour line, and has two spots of 3 fathoms, while the inner reef, about 600 yards southwestward of the preceding, and the same in extent, has several rocky heads with less than 1 fathom, which occasionally break.

Buoy.—A white spar buoy, with "Daphne" in black letters, and surmounted by two black inverted triangles, is moored in a depth of 8 fathoms on the southeast extreme of the Outer Daphne Reef.

Clearing marks.—Gunja Peak in line with Ras Kankadya, bearing 287°, leads 800 yards northward, the western tangents of Bongoyo in line 312° leads northeastward, while the East Ferry Point flagstaff, bearing 204°, leads southeastward of Outer Daphne Reef.

Boats working up in shore in the northeast monsoon, when in the vicinity of Inner Daphne Reef, should tack directly to the south extreme of Bongoyo opens of Ras Kankawya, about 343°.

Depths.—The depths in the fairway of the entrance, on the leading mark, are from 14 to 16 fathoms, and from 4 to 7 fathoms, over mud, at the anchorage.

Signal station.—The signal station on East Ferry Point is a conspicuous white tower, which may be seen from a distance of 10 miles in clear weather.

Radio station.—The radio station on the west bank of Dar es Salaam Inlet is open to the public from 7.30 a. m. to 11.30 a. m., from 4 p. m. to 6 p. m., and from 8 p. m. to 11 p. m. on week days; on Sunday it is open from 9 a. m. to 11 a. m. and from 8 p. m. to 10 p. m. The call letters are K. A. C.

Directions.—Approaching Dar es Salaam Bay from the southward, the Sinda Islands will first come into view, and the outer island should be given a berth of 2½ miles to clear Millard Bank, by keeping Gunja Peak in line with Ras Kankadya, bearing 287°, and steering on this mark until the lighthouse on Outer Makatumbe Island bears 253°, and the Inner Sinda Island is open westward of the Outer Sinda, about 184°, when steer to round Hammond Rock Buoy to the anchorage.

From the northward, Mbudya Island, about 1¾ miles northward of Bongoyo, will be first distinguished by its clump of trees, and it should be given a berth of at least 4 miles in order to pass outside the Mbudya Patches. Run along shore at this distance until the Outer Makatumbe Island Lighthouse bears 196°, and steer for it on that bearing.

When the hospital on Ras Chokir, a large two-story building, which may be seen 16 miles distant, bears 216°, steering for it leads midway between the buoys marking Outer Daphne Reef and the spit extending from Hammond Rock, and the East Ferry Point lookout, bearing 204°, leads through the bay until Inner Makatumbe Island bears about 118°, when steer for the anchorage.

Anchorage.—In either monsoon the best anchorage for vessels of moderate draft is in a depth of 4 fathoms, over mud, with the white quarantine station bearing 127° and Hammond Rock 48°. A vessel of light draft can, with advantage, lie nearer Inner Makatumbe, but those of deep draft must anchor farther northward, in 7 or 8 fathoms; sailing vessels must anchor in the bay and show their house flags.

Tides.—It is high water, full and change, in Dar es Salaam Harbor at 4 h. 12 m.; springs rise 10¾ feet, neaps 8 feet, neaps range 5¼ feet.

Tidal streams.—The tidal streams in the vicinity of Dar es Salaam Bay are variable and uncertain, the change of the monsoon working an entire reversal, in most instances, both in their direction and strength; in the bay the velocity is not great.

As a general rule, the northwest-going stream is that of the rising tide, the other stream setting southeastward, but amongst the islands and reefs the streams will often be found setting in opposite directions, as on Mbudya Patches, where, in the northeast monsoon, the stream sets as above mentioned, but, at the same time, inside Bongoyo Island they are reversed; outside these patches the streams set generally to the northward and southward, respectively.

In the southwest monsoon, at about 6 miles from the land, the current always runs northwestward at rates of from 1 knot to 3 knots.

Dar es Salaam Harbor, entered between South Reef, extending 600 yards northward of Ras Rongoni, and continued for a farther distance of ½ mile by shore bank, under 3 fathoms, on the east, and North Reef (North Sandhead) stretching about 1,800 yards eastward of Ras Chokir, which has red cliffs 30 feet high on the west, is 300 yards in width between the points of these reefs, and from this entrance extends nearly 1 mile in a southwest direction, to East and West Ferry Points, both low and sandy, and on either side of the inner entrance.

Within these inner points the harbor forms a basin nearly 1 mile in length in a west-southwest and opposite direction, with a width of about ½ mile, and from its southern side Dar es Salaam Inlet extends to the southward, with a curve to the southwest for 2½ miles, its general width being nearly ½ mile, while on the southwest side of the basin is the entrance to Mto Kurasini, crossed immediately within by a bridge.

The shores of the basin mostly consist of cliffy land from 20 to 30 feet high, the town occupying the north and northwest shores, the coal depot being on the former and the customhouse on the latter shore; the banks of Dar es Salaam Inlet are steep and fronted by mangroves, and for a distance of 2 miles it is navigable, but above that it bifurcates, both branches drying at low water, springs, and it is said ending in a mangrove swamp.

Entrance.—The entrance to the harbor between the points of the shore bank is about 600 yards in width, its navigable fairway between the points of the shore reefs being reduced to 200 yards and to 125 yards in places farther in; owing to the outer part of the entrance lying between the extremes of shoals, it is not easily distinguished even from the anchorage in the bay.

A rocky patch off the southeast end of North Reef presents the great difficulty in entering or leaving, as it makes the turn more abrupt, and narrows the navigable channel at that part to 120 yards; the turn between East and West Ferry Points is a curve, but it is easy there to keep in mid-channel.

Dangers.—In addition to the rocky patch mentioned, two small shoals of 2¾ and 3 fathoms lie on the southern side of the fairway, about 800 yards northeastward of East Ferry Point.

A bank about 800 yards in length, with a least depth of 3½ fathoms, lies parallel to and about 300 yards from the north shore of the basin, and fronting the entrance to Mto Kurasini, is a bank about 150 yards in length, in a northwest and opposite direction, with a least depth of 1½ fathoms.

Buoys.—A red spar buoy with "Dr.s.m." in white letters on it and surmounted by a white A, is moored in a depth of 4¼ fathoms, as a fairway buoy at the outer entrance.

A red spar buoy with "Dr.s.m." in white letters on it and with a white letter B as a topmark, is moored in 6 fathoms southeastward of the rock off North Reef.

On the north side of the fairway and about 400 yards northward of East Ferry Point, is a similar buoy to the foregoing, in 3¾ fathoms, but with "Dr.s.m." in white letters on it and a white C as a topmark.

The east and south side of the channel are marked by five black conical buoys, the outer of these being marked "Dr.s.m.," and moored northwestward of the 1¾-fathoms patch on the bank connecting Makatumbe Islands Reef with the shore; the second buoy, marked "1 a," is about 700 yards northward of Ras Rongoni.

The other three buoys, marked from outward, respectively, "2/Dr.s.m.," "3/Dr.s.m.," and "4/Dr.s.m.," are on the edge of the bank extending northward of Ras Makabe and the shore about 400 yards eastward of it.

The bank fronting Mto Kurasini is marked at its southeast end by a white spar buoy, surmounted by two black triangles, bases together, and the northwest end by a similar buoy, but having two triangles, both pointing upward.

Depths.—The depth at the entrance near the fairway buoy is 4¼ fathoms, increasing to from 6¼ to 10 fathoms, for a distance of about 1,200 yards within the North and South Reefs, beyond which a bar about 600 yards in width, with depths of from 3½ to 4 fathoms, crosses the channel, after which the water again deepens to from 6¼ to 10 fathoms between East and West Ferry Points, the depths at the anchorage northward of the bank fronting the town being from 6½ to 9 fathoms.

Mooring buoys.—The positions of several mooring buoys in the harbor will be seen on the plan.

Signals.—A white ball is hoisted at the lower yardarm of the signal station mast on East Ferry Point, as soon as an outgoing vessel has passed West Ferry Point, and the ball is hauled down when the vessel has passed Buoy B.

Pilots.—On making the usual signal a pilot boat should be found waiting near Outer Makatumbe Island, but pilotage is only compulsory on merchant vessels of over 100 tons. The rate of pilotage is 30 rupees for vessels of 1,000 or more tons, with an addition of 1 rupee for every 100 tons over 1,000 tons.

Tugs.—A vessel requiring a tug should anchor in the bay and hoist the signal for one by the International Code.

Directions.—The most conspicuous objects are the red cliffs of Ras Chokir, with the Government hospital above them, while nearly midway between the cliffs and West Ferry Point is Government house, the Anglican mission house being close to the point; the Roman Catholic Church in the town has a sharp spire, and the Evangelical Church a square white tower and a red roof.

On the south side of the channel, about midway between the beacons on Ras Rongoni and East Ferry Point, is a white pillar and a white stone wall, while on the point the white lookout house, with its tower, is conspicuous; a short distance eastward of Ras Makabe is a baobab tree with a white trunk.

In a vessel whose draft will admit the best time to enter the harbor is at low water, when the reefs on either side can generally be seen from aloft, but a vessel of deeper draft should enter at high water, and in no case should entering be attempted during the full strength of the in-going nor leaving with a similar condition of outgoing stream.

From Dar es Salaam Bay bring the white obelisk on Ras Rongoni in line with the beacon, bearing 177°, and steer on this mark, passing eastward of the fairway Buoy A, and westward of No. 1 black buoy, when the southeast extreme of the conspicuous coconut clump, southeastward of Mto Kurusini, will be touching West Ferry Point there being not less than 4 fathoms on this line.

From Buoy No. 1 steer to pass about 100 yards southward of the red spar buoy B and for the red spar buoy C until the white pillar, nearly midway between Ras Rongoni and East Ferry Point, is nearly on with the western end of the white stone wall behind it, about 148°, when keep somewhat to the northward to avoid the 2¾ and 3-fathoms patches nearly in mid-channel and, which will be passed when the same pillar is in line with the east end of the wall, about 130°, the vessel being abreast these patches as long as the pillar is seen in line with any portion of the wall.

From southeastward of the red spar buoy C steer to pass in mid-channel between East and West Ferry Points and keeping well to northward of the black buoys marking the bank off Ras Makabe a course may be steered for the anchorage.

The tidal stream is strongest about two hours after slack water and sets over the mid-channel patches, and is particularly strong near West Ferry Point; the outgoing stream sets strongly toward the buoys marking the bank of Ras Makabe, and if leaving during that stream great care is necessary after passing No. 1 black buoy to avoid being set on to the bank on the east side.

Anchorage.—Vessels should not anchor in any part of the channel when within the fairway buoy until within the Ferry Points unless in a case of absolute necessity, and then the telegraph cable must be avoided. Unless an anchorage has been indicated by a harbor official, which is done by means of a boat with a green flag, for which the vessel should steer and anchor when the flag is dropped, a good berth will be found with the Evangelical Church bearing 312° and the Roman Catholic Church 285°.

Landing may be effected at several landing stages, and there is a customhouse quay, but No. 1 Pier is reserved for Government officials, and boats are not allowed to make fast to piers nor to lie alongside for any length of time.

Tidal streams.—During springs the stream is strong in the harbor channel, especially toward or after low water, as it is then confined to the channel itself. The strongest stream is generally about two hours after slack water, at which time it sets strongly round West Ferry Point; when North Reef is covered the stream sets across its southern edge between B and C Buoys. The outgoing stream sets eastward over the shoal flat, connecting Makatumbe Islands with the shore, and after heavy rains this stream commences to run before the time of low water.

Town.—The town of Dar es Salaam, the capital of German East Africa, occupies the north and northwest shores of the harbor and is elevated about 30 feet above the water, from which several flights of steps lead to it; it has many well-laid-out streets, with blocks of buildings, among which are Government residences for the governor and other officials, besides a fort and post and telegraph offices, the churches having been mentioned.

The population is about 17,700, of which about 700 are Europeans.

Communication.—The Central Railway runs to Kigoma, on Lake Tanganyika. A cable connects Dar es Salaam with Bagamoyo, thence with Zanzibar, and there are land wires south to Kilwa and Mikindani and north to Bagamoyo and Tanga. There is also telegraphic communication with Muansa, on Victoria Nyanza.

Coal and supplies.—About 3,500 tons of coal are kept in stock, half of which belongs to the Government and the other half is available for merchant vessels.

Fresh provisions are plentiful and vegetables may be obtained between May and October.

An abundant supply of good spring water is obtainable from Mto Kurusini, and the supply to vessels is conveyed to the harbor through pipes terminating in tanks, but this water is said to be slightly brackish and very unpleasant to drink. They are supplied by two large and several small tanks, the larger having steam pumps, so that from 50 to 60 tons can be put on board in an hour. Vessels requiring water should hoist letter W of the International Code.

Repairs.—Only small repairs can be executed, but workshops are in course of erection.

Hospitals.—Two hospitals are maintained, one in the town being for natives and the other on Ras Chokir, with 30 beds, is for Europeans.

Time signal.—A gun is fired daily from the saluting battery near the harbor office at noon, standard time of the meridian 37° 30′ east, corresponding to 21 h. 30 m. and 00 s. Greenwich mean time.

Trade.—Considerable trade is carried on with the interior, caravans with ivory and other produce for shipment occasionally arriving, while the principal articles of export are copal, corn, maize, and sesame; coasting trade is carried on by dhows.

Zanzibar Channel, about 95 miles in length, with a least breadth of 16½ miles, separates the mainland from Zanzibar Island, both shores being generally parallel to one another; it is studded on either side by coral reefs, which in one place reduce the navigable fairway to less than 3½ miles, the dangers on the mainland side of the southern entrance being those outside Dar es Salaam.

On the mainland side the reefs are sometimes not easily distinguished on account of the discolored water caused by the alluvium of the rivers, but on the island side the water is generally clear, so that the reefs can be plainly seen; the positions of the sand heads on the coral reefs usually change with the monsoons.

Depths.—The least depths in Zanzibar Channel are from 14 to 15 fathoms.

Western shore.—**Bongoyo,** a rocky island 40 feet high facing Msasani Bay and protecting it from the swell, is 1½ miles in length in a northwest and opposite direction, with an average width of 400 yards and presents a uniform outline of stunted trees on cliffs 40 feet in height; it is uninhabited and all but impenetrable. A sandy bay, in the center of the northeastern shore, shows white and conspicuous with the morning sun.

The surrounding reef, dry at low water, extending eastward more than ½ mile from the southern half of the island, is not very steep-to, but the sea always breaks on it, and a detached rock with 6 feet water, which breaks occasionally, is 1,200 yards east-southeastward of the southern point; on the western side the reef dries off nowhere more than 200 yards. North Island, an isolated rock 8 feet high, lies off its northern point.

The soundings eastward of Bongoyo and its reef are irregular.

Msasani Bay, entered between Ras Kankadya and the southeast extreme of Bongoyo, is sandy throughout and intersected by creeks leading from mangrove swamps and backed, at a distance of 3 miles inland by a long, thickly wooded, featureless hill, rising at its northern end to Gunja Peak, a slight summit 600 feet in height.

The bay affords good anchorage during either monsoon and is safe and easy of access from the southeastward, but its southern and western sides are shallow, the sand drying in some places 1,200 yards from the shore, and the 3-fathoms line of soundings being in other parts nearly 1½ miles from high-water line. From the village of Msasani, at the head of the bay, the shore sweeps round to the northward for 6 miles to the village of Konduchi.

Anchorage.—In the northeast monsoon the best berth is in a depth of 8 fathoms, over sand, westward of the center of Bongoyo, with its northwest extreme bearing 348°, about 1,400 or 1,600 yards.

During the southwest monsoon a berth more to the northward, about ½ mile off the northwestern point of Bongoyo Island, should be taken, or, if preferred, in the southern part of the bay, in about 6 fathoms, with Ras Kankadya bearing 86°. From the latter berth landing is easy at the village of Msasani, in the southeast angle of the bay, from which it is two hours' walk to Dar es Salaam.

Directions.—To enter Msasani Bay bring Gunja Peak midway between Ras Kankadya and Bongoyo Island, bearing about 281°, and steer for it until Inner Makatumbe Island is in line with Ras Kankadya, about 144°, then alter course to 326° for Pangavini Islet, if proceeding to the northern part of the bay. If intending to anchor westward of Ras Kankadya, round the point as convenient.

Mbudya, the northernmost of the chain of off-lying islands mentioned is formed of coral, faced with low cliffs and stands on a ledge of coral. It is ¾ mile long in a north-northwest and opposite direction, of triangular form, and has a square clump of trees 60 feet high, showing above the other foliage. It is uninhabited, but fishermen occasionally camp on it.

The surrounding reef, 2 miles long and 1 mile wide, dries at low water, the greater part being eastward and southward of the island. Its inner side is tolerably steep, but the outer side deepens gradually, has outlying patches, and is therefore dangerous to approach.

Mbudya Spit, with 3 fathoms, lies 2 miles southeastward of the south point of the island, and a 2¾-fathom patch, ½ mile in a north and south direction and very narrow, lies ½ mile eastward of the spit.

Mbudya Patches, a number of small patches at various distances outside Mbudya Island, the outer one being 4 miles from it, have from 3¾ to 5 fathoms water, but their neighborhood should be avoided.

Pangavini Islet, 1 mile southwestward of Mbudya Island, is a rocky islet ¼ mile in extent and 30 feet high on the northwestern part of a coral bank 1,600 yards long, which dries 2 feet. The islet is 1 mile from the mainland shore, and there is a narrow 7-fathom channel between.

At 1,200 yards northward of Pangavini Islet is a 3-fathom patch about 600 yards in extent.

Fungu Mkadya is a coral reef 1½ miles in length drying 2 feet at low water, its southern end, with 2½ fathoms, being nearly 1 mile northwestward of Mbudya and the reef about the same distance from the mainland shore, with a clear 6-fathom channel between and close along the reef.

Konduchi Harbor, the anchorage southwestward of Mbudya Island affords shelter during the northeast monsoon for a vessel requiring temporary anchorage, although that within Bongoyo is preferable.

Directions.—Konduchi Harbor may be entered either from the northward or southward, the latter being the better entrance during the northeast monsoon; to enter by it steer in with the north point of Bongoyo Island bearing 273° until Pangavini Islet bears 293°, when steer for it until the west extreme of Mbudya bears 344° from which a course about 318° leads to the anchorage.

The northern channel is only 800 yards wide at low water, for a vessel of 18 feet draft, and the center of Pangavini Islet bearing 180°, leads in between Fungu Mkadya and Mbudya, and eastward of the 3-fathom patch northward of Pangavini; the northern edge of Mbudya Reef, although not steep, generally shows.

Anchorage may be obtained during the southwest monsoon to the northward of the 3-fathom patch, in about 10 fathoms, with the north extreme of Mbudya bearing 85°, and the center of Pangavini 178°; for a small vessel it is only necessary to give the western point of Mbudya Island a berth of 800 yards. Or anchorage may be taken up in a similar depth with the west end of Mbudya 20°, and the north end of Pangavini 219°.

Villages.—Konduchi and Changani Villages are on the beach northwestward of Pangavini, near Mto Peremji, the sand drying off about ½ mile in front of them.

Fungu Yasin, a coral reef 1½ miles in length in a north and south direction, dries over a large area at low water, springs, and has a sand head 4 feet above high water on its northwestern extreme, situated nearly 3¾ miles north-northwestward of Mbudya. On the western side the reef is steep-to, but at the southeastern end a bank with 4 to 5 fathoms extends about 1 mile, with a patch of 3 fathoms near its extreme.

Beacon.—On the sand head is a white and red beacon, with a triangular topmark; in clear weather it may be seen from a distance of 10 miles.

Anchorage.—There is good anchorage within Fungu Yasin during either monsoon in depth of 16 fathoms, opposite the center of the reef, with the sand head beacon bearing about 31°, distant ½ mile. The safest approach to the anchorage is round the northern end of the reef.

Coast.—From Konduchi Village the coast trends northwestward with some sinuosities for about 16 miles to Waso, and a few miles inland are low, rounded, wooded hills, which, in the vicinity of Konduchi, rise to a height of 500 feet. From Konduchi the coast is sandy for a short distance and then rocky to Ras Kiromoni, a low point with a small bay on its western side, where there is fair landing during the southwest monsoon.

At 4½ miles northwestward of Ras Kiromoni is Bueni village, rendered conspicuous by some white tombs and large mango trees, and several villages are on the shore between; along this coast the sand or coral dries from 600 to 1,800 yards off, with outlying dangers.

From Waso the coast, turning west-northwestward for 3½ miles to Ras Luale, is a low sandy beach, bordered by coral ledges and banks, and backed by mangrove swamps or dense bush.

Dangers.—Ukatani Reef, 1½ miles east-northeastward of Ukatani village, is small, and awash at low water, springs; a small patch, with less than 1 fathom, lies between it and Ras Kiromoni, and about 1,600 yards offshore.

Bueni Reefs are two in number, and about 1 mile apart; the southeastern reef has a depth of 2 fathoms and the northwestern, about ½ mile in extent, has a rock with less than 1 fathom near its northwest end, about 1¾ miles northeastward of Bueni village. These dangers are both difficult to distinguish, as the sea seldom breaks and the water is thick.

Kitapumbe Reefs are two coral patches lying off the village of that name, the southeastern reef, 2½ miles from the land and 3½ miles northward of Bueni village, being about 1 mile in length, and drying 2 feet at low water, springs. The other, nearly 2 miles farther northwestward, is 1 mile in diameter, 2 miles from the shore, and dries 4 feet; these dangers are fairly steep-to, and the sea generally breaks on them, but the water is thick in their vicinity.

Buoy.—A white spar buoy with "Kitap" on it in black letters, and surmounted by two black triangles, bases together, is moored in a depth of 9 fathoms, eastward of the drying patch on the southeastern reef.

Mshingwi, a small coral reef on which the sea generally breaks, even when covered, lies 1 mile off the center of the sandspit inclosing Mwangotini Lagoon; it is steep-to, and dries 11 feet at low water, springs, with 9 fathoms around.

Mwangotini Lagoon, 4 miles long in a west-northwest and opposite direction by 1 mile wide, is formed by a long, narrow tongue of coral and sand about 300 yards wide and covered with thick bush, which extends parallel with the shore from abreast Waso and ends in Ras Luale; Ras Mbegani, the western point of entrance to the lagoon, is also a low mangrove point, and is distant 1 mile from Ras Luale.

The lagoon is mostly dry at low water, but there are narrow channels leading to Mbegani and Mwangotini villages on its southern side, the position of the latter marked by tall coconut trees and white tombs; the lagoon ends in mangrove swamps.

Coast.—From Ras Mbegani the coast forms a slightly receding sandy bay for 5 miles northwestward to Ras Nunge, a mangrove point which shows well out from the land when near the shore, with Kaole and Bagamoyo lying between; the former, a village almost hidden from seaward by trees and situated about 1¼ miles westward of Ras Mbegani. Mto Ruvu (Kingani) Entrance is 2½ miles west-northwestward of Ras Nunge, the coast between being a mass of mangroves.

Kebandahodi, a large bank of sand and mud, nearly awash at low water springs, lies north-northeastward of Kaole village, the edge of the shallow water extending from its north extreme toward Ras Luale and Ras Nunge; it is tolerably steep.

The sea generally breaks on the northern part of this bank; but if not, the water being thick and muddy, the bank can seldom be seen.

Mbwakuni, a dangerous reef nearly 2 miles long in a west-northwest and opposite direction and 1,600 yards wide, lies 6 miles northeastward from Bagamoyo and dries all round at low water, springs, with from 6 to 9 fathoms close-to; several coral heads on it are visible at half ebb, and on the western end is a sand bank which dries 11 feet and is consequently nearly always above water, the sea usually breaking on it when covered.

Current.—The current off this part of the coast depends greatly on the direction and strength of the wind, and in the southwest monsoon it sets strongly northwestward past Mbwakuni Reef, but nearer the shore it is not so strong. In the northeast monsoon if the wind is fresh the north-going set is only experienced with a rising tide, but at this season the current is very variable.

Bagamoyo.—The roadstead of Bagamoyo is between the north extreme of Kebandahodi and Ras Nunge, the 3-fathom contour line stretching with some sinuosities between these two points; the 5-fathom contour line is about 3 miles offshore, leaving a space nearly 1 mile in width, with depths of from 4 to 5 fathoms between it and the 3-fathom contour.

Buoys.—A red spar buoy with a white rectangular topmark and "7 meters" on it, indicating the depth (3¾ fathoms) in which it lies, is moored 4 miles southwestward of Mbwakuni Beacon.

A red conical buoy, with "4½ meters" on a white tablet, indicating that it is moored in 2½ fathoms, lies northward of the line of the telegraph cable from Dar es Salaam, and 1 mile from the beach.

Directions.—Approaching Bagamoyo from the southeastward steer to pass about midway between Kebandahodi Buoy and Mbwakuni Beacon, and when the trees at the fort bear 211°, steer for them.

If coming from the Southern Pass of Zanzibar, Hatajwa, a hill 206 feet high, on the southwest side of Zanzibar Island, kept in line with the south point of Chumbe, an islet on the east side of the entrance to the pass, bearing 79°, and used as a stern mark, steering 259°, leads between Boribu and Tambare Reefs, from which steer to pass about 1 mile northward of Mbwakuni Beacon, and when the trees bear 211° alter course for them.

Proceeding to Zanzibar Harbor in thick weather and during the southwest monsoon when the currents are strong, it is best to pass between Kebandahodi Buoy and Mbwakuni Beacon, steering about 10 miles to the eastward, and to pass westward of Ariadne Bank. If Hatajwa Hill can be seen bring it to bear 62°, which will lead between Boribu, drying 8 feet, and Ariadne Bank, with 2¾ fathoms.

Caution.—At high water, when the sun is ahead of the vessel, during calm weather, with a mirage, or when shadows of clouds are on the water, it is dangerous to trust to the eye, and bearings or angles of objects alone should be depended on.

Anchorage.—The water shoals gradually to the shore, and as the swell is heavy in both monsoons, making anchorage in shallow water uneasy, it is advisable to anchor some distance off. A moderate draft vessel should anchor in a depth of 5 fathoms.

Landing.—At low water on some sand covering a coral ledge drying nearly 1 mile from the shore dhows ground and unload, but the best landing place, with any wind, is nearly abreast the Roman Catholic Mission, at the northern end of the town, where at low water a coral ridge, trending parallel to the beach, forms a cove, with generally smooth water, by its abrupt termination at the sand bank fronting the town; this ridge, although covered at high water, breaks the swell.

Town.—The town of Bagamoyo, standing a few feet above the sea, on a low but steep bank of a sandy bay, has stone houses interspersed between palm huts, and is one of the most important in German East Africa, being the chief point of arrival and departure of caravans from and to the interior; it has a population of about 5,000, of which about 40 are Europeans and 550 Indians.

Communication.—A telegraph cable connects with Dar es Salaam, and with Zanzibar, and a land line with the former place; there is a good road to the former place.

Supplies of bullocks, sheep, goats, and fowls are always procurable, and cheap.

Mto Ruvu (Kingani River), coming from the southwestward, and following an extremely tortuous course, flows 3 or 4 miles inland of Bagamoyo, and into the sea about 4 miles northwestward of it. The river, which has several names, Kingani being the best known on the coast, could be made useful as a means of transport for about 50 miles or even more when moderately high.

Bar.—Mto Ruvu is fronted by a shifting bar varying in depth, drying about 2 miles from the shore, with the sea usually breaking heavily on its edge, but there is generally a canoe passage through the drying bar at low water. Numerous snags encumber the direct approach, rendering it advisable to approach either from northward or eastward. After one hour's ebb no heavily laden boat should attempt to pass either in or out.

The actual entrance is 1,200 yards wide from mangrove to mangrove, and ½ mile inside is Windi Ferry; the river is winding, with a general south-southwesterly direction, and an average width of 100 yards for 12 miles, but this is only 5 miles distant in a direct line from the mouth.

To this point the river runs mostly through dense mangroves, although a few pieces of bare prairie, inundated during rains, are passed; after this the open country begins, with a flat grass plain on the right bank, extending 2 miles from the river to the edge of a low but steep-faced plateau.

In this locality cultivation also commences, maize, manioc, millet, and sweet potatoes being the principal cereals and roots grown, together with coconuts and plantains. At 19 miles from the entrance but only 7 miles in a direct line, is Kingwere Ferry, where the river is 40 yards in width, but 2 miles above this it narrows to 25 yards and flows through forest, the land being flat and the banks steep and about 8 feet high; the river about this part becomes somewhat dangerous with snags and sand banks.

A short distance farther on the Mto Kangeni a large feeder runs into it from the westward, and at 10 miles above Kingwere the river is close to the edge of the plateau before mentioned, a steep cliff, about 40 feet in height, forming the right bank; the river is tidal to some point between Kingwere and this.

From this, for about 5 miles to Dunga, a small village standing on a hill on the right bank, and the highest point reached by the boats of the British naval vessel *Shearwater*, the river runs at a short distance from the steep edge of the plateau, now touching it, and now sweeping away with bold bends.

At Dunga, which is about 35 miles from the entrance by the river, but only 15 miles direct, the width is about 18 yards, and the river is said to maintain this size for many miles.

On the left bank a broad plain stretches to the foot of low undulating hills, and 8 miles from the river giraffe, zebra, buffalo, hartbeest, and other large game are found, especially when the dry season forces them into the neighborhood of the rivers for water, but the river is unhealthy, fever generally following any sojourn on its banks, and sleeping in boats seems to afford no immunity.

Depths.—At about 1½ hours before high water the depth is about 5 feet on the bar, the depth between the points of entrance being about 2 fathoms; at Dunga village there is about 6 feet.

Coast.—From the mouth of Mto Ruvu to Ras Windi, a distance of 9 miles, the coast trends northward, forming a long bight, and is a mere strip of sand backed by mangrove swamps, on which are two or three hamlets, their positions being known by clumps of coconut trees. The tidal streams set through a break in the sand 2 miles southward of Ras Windi, and, during the rainy season, drain the superfluous water from the inundated plain.

Kungwe, a mountain 5,807 feet high, situated some distance inland behind the plain, is said to be visible from Zanzibar, a distance of 80 miles, and to have two summits, rendering it liable to be mistaken for Genda Genda, farther north.

Ras Windi, a sandy point, may be known from the southward by a small but conspicuous clump of trees just northwestward of it; from the northward the bright beach at Ras Utondwe shows from a distance of 12 miles fronting these trees. It is fronted at a distance of 1 mile by a coral ledge, drying 6 feet at low water, springs, on which the sea breaks heavily, with shallow water beyond it.

Windi village, with a population of about 1,000, stands on very low ground about 2 miles southward of Ras Windi, and a little within the strip of sand described, which conceals the huts from view at low water; several smaller villages, in groups of coconut palms, lie southward of it. From seaward some white tombstones indicate the position of the village.

Fungu Miko consists of two small reefs on which the sea generally breaks, the northern, a head of broken coral, 7 miles eastward of the conspicuous white tomb at Windi, dries 8 feet; the southern and larger reef, about 1,400 or 1,600 yards southward, dries 6 feet. Depths of 12 fathoms are found close to both reefs.

Buoy.—A white spar buoy, with "Miko" in black letters and surmounted by two black triangles, bases together, lies in 14 fathoms off the eastern extreme of Fungu Miko Southern Reef.

Windi Patches, two coral reefs which generally break, are dry at low water, springs, the southern one, 600 yards in diameter, drying 6 feet, is steep-to, with 7 to 8 fathoms around, and lies 3½ miles 96° from Ras Windi. The northern reef, 1 mile north-northeastward from the southern, dries 4 feet, with 10 to 12 fathoms around.

Buoy.—A white spar buoy marked "Windi" in black letters and surmounted by two triangles, bases apart, lies in 7 fathoms westward of the southern patch.

Coast.—Ras Utondwe, 3½ miles northward of Ras Windi, is a low sandy spit, with a small bay northward of it, at the head of which is Mto Utondwe, a salt-water creek having the appearance of a river, but ending in mangrove swamps 2½ miles from its mouth, and having no fresh water. It was probably at one time connected with the Wami, as the intervening country is one vast mangrove swamp, entirely inundated during the rains.

Wami Patches consist of eight separate small coral patches lying from 6½ to 7½ miles northeastward of Ras Utondwe, and varying in depth from 1 fathom to awash at low water, springs; they occupy a space over 2 miles in length in a northwest and opposite direction by 1 mile in width, and are steep-to, having 11 to 15 fathoms around them.

These patches are dangerous, as the mud from the Mto Wami and other rivers thickens the water at times to such a degree that at high tide they are invisible.

The southern extreme of the flat Udoe Hill, bearing 267°, leads nearly 2 miles southward of these patches, but the hill is not shown on the chart; it is a flat range, about 800 feet high, situated behind the low land, and sloping sharply on its southern side to a broad valley.

Buoy.—A white spar buoy, with "Wami" in black letters on it and surmounted by two black triangles, bases together, lies in a depth of 14 fathoms, just eastward of the eastern Wami Patch.

Tides.—It is high water in the vicinity of the Wami Patches, at full and change, at 4 h. 15 m.; springs rise 15 feet, neaps 10 feet.

Mto Wami has two mouths; of these Chunango, the southern, is 2 miles northward of Ras Utondwe, and Purahanya, the northern, is 1 mile farther northward; both are difficult to distinguish on account of the coast being fringed with mangroves, and the rivers taking abrupt turns from the entrances. The Purahanya is the principal entrance, and both have shifting bars which vary with the seasons and dry completely across at springs, so that a boat will find difficulty in getting in after half tide.

The Chunango Branch comes to an abrupt termination at 3 miles within its entrance and is dry at low water; a little below this point a narrow and tortuous channel, also dry at low water, leads to the principal branch.

The Purahanya Branch, inside its bar, is about 10 yards wide and 12 feet deep at low water, springs, with mangroves on either side. About 1,600 yards within the entrance, on the right bank, is a tract of rising ground faced by a red cliff about 6 feet above high water, and at 2 miles up at the fork of the channel leading to the Chunango Branch the river is only 20 yards wide at low water.

Above this, near another steep cliff on the left bank, it gets rapidly shallow, with snags and sand banks blocking the channel, and at low water a steam cutter can not proceed more than 1 mile above the junction, while at a point 1½ miles farther a small boat will find it difficult to proceed, although some miles beyond the river slightly improves and deepens, and habitable land is reached at about 7 miles from the mouth, all below that being dense mangrove and flooded lands.

The Purahanya mouth is difficult to find, but the south fall of Udoe Hill bearing 258° leads to it; the 3-fathom contour line, near that of 5 fathoms, is about 3 miles off the mouths.

The river appears to be less dangerous to health than some others on the coast, as, when explored, sleeping in boats was not followed by evil effects. The country is inhabited by the Wadae Tribe, and about 10 miles from the coast large game is said to be plentiful, while both hippopotami and crocodiles frequent the river.

Mariner Shoal, ½ mile in extent, and drying in places about 3 feet at low water, lies about 2¾ miles north-northwestward of the Purahanya Mouth of the Mto Wami.

Coast.—Between Mto Wami and Ras Machuisi, a distance of about 11 miles, the coast, forming a long bight receding about 2½ miles westward, is of the same character, low, with a sandy beach, with a considerable amount of mangrove about the mouths of the several rivers, and a sandflat drying out 1,000 or 1,200 yards.

Saadani, a large village of low mud huts, 6½ miles north-northwestward of Purahanya Mouth, is the principal place between Bagamoyo and Pangani, and numbers about 1,770 inhabitants; the customhouse, a low building with two roofs, is just visible between the trees. Southward of the village is a peculiar-shaped hill, appearing from a distance like a house, and to the northward of Saadani are several smaller villages, while many streams and swamps open into the sea on this part of the coast.

Buoy.—A red conical buoy, surmounted by a white tablet with "4½ meters" on it as a topmark, signifying that it lies in 2½ fathoms, is moored about 1½ miles eastward of the village.

Anchorage.—The Government steamers that visit the port anchor in a depth of 2¾ fathoms outside the buoy.

Communication.—Saadani is a post and telegraph station, and has a telephone.

Supplies of fresh mutton, poultry, and eggs may be procured.

Ras Machuisi, projecting slightly, is distinguished by a dense grove of trees, which shows conspicuously northward or southward; Buiuni village is on the shore 1 mile to the northward.

Machuisi Reef, the south extreme of which is about 1 mile eastward of the point, and separated from the shore flats by a 3-foot channel, is about 1¼ miles long in a north-northeast and opposite direction, and nearly awash at low water, springs; the 3-fathom contour line is 1 mile seaward of the reef.

Coast.—From Ras Machuisi the coast trends northward, with slight indentations, for 31 miles, to Pangani Bay, a sandy beach skirting the shore, the whole distance being used as the road connecting the villages near the sea: at low water, coral ledges or sand flats dry off ½ mile, and are again bordered by shallow water for some distance.

The land immediately at the back is low, but 3 or 4 miles within it rises gently to the coast range of from 300 to 600 feet, and behind this again occasional higher land is seen, the whole being densely wooded; numerous small streams fall into the sea, but only one is of any considerable size.

On the coast between Ras Machuisi and Sange Islet are several small villages, amongst which Mkwaja is the most important. Ushongu village is about 11 miles northward of Sange Islet, and northward of the village for about 4 miles, the coast is a sandy beach bordered by shallow water for some distance, and backed by forest; from thence, rocky, with low cliffs, for about 2½ miles to Ras Kikokwe, the southern point of Pangani Bay. At some distance inland are low flat hills, gently sloping eastward.

Offlying dangers.—Mwamba Buiuni, 4½ miles northeastward of Ras Machuisi and 3½ miles from the shore on the edge of the 5-fathom contour line, is of dead coral and dries 8 feet.

Buiuni Mdogo is a small reef awash at low water at its western end, steep-to, with 9 fathoms close around, lying 1¾ miles northeastward of Mwamba Buiuni and 5 miles from the shore.

Mkwaja Patches, consisting of four coral patches, steep-to, covering an area of 1,200 yards, with 13 fathoms water between and around them, lie 3 miles north-northeastward of Buiuni Mdogo, and have an average depth of 6 feet over them at low water, springs; they are dangerous on account of their small size, and as the sea rarely breaks, are difficult to be seen.

Buoy.—A white spar buoy marked "S/MKJ" in black letters and surmounted by two black triangles, both pointing downward, lies in 4 fathoms off the southern extreme of the patches.

Mwamba Alek, lying nearly 3 miles northeastward of the Mkwaja Patches, is small, with 1 fathom least water, and depths of 4 fathoms northwestward and southeastward of it, but otherwise steep-to, and 20 fathoms close around; it is generally visible from the masthead, but the sea does not break on it.

Buoy.—A white spar buoy marked "O/Alek" in black letters and surmounted by two triangles, bases together, lies close to the eastern end of this danger in 12 fathoms.

Coast.—Sange Islet, small, rocky, 15 feet above high water, and standing on a coral ledge within the low-water line, about 2½ miles northeastward of Kisikimta Village, is not very conspicuous. Kisikimta boat harbor, about 1½ miles south-southwestward of the islet, is an inlet in the coral reef, with a depth of 1 fathom.

Mto Kipumbwe, debouching in a bight about 4½ miles northward of Sange Islet, is of considerable width at the mouth, which is lined by mangrove swamps but rapidly narrows, and though natives state that it is navigable for a few days' journey it can not be large. It probably rises in Genda Genda Mountain, which is seen up the gorge in the hills through which the river passes. Its bar dries completely across at low water. The large village of Kipumbwe, where fresh provisions may be obtained, stands on the northern bank of the entrance.

Genda Genda, an isolated and apparently volcanic mountain, 17 miles inland from Kipumbwe, is conspicuous and easily recognized by its two sharp peaks, the southern one 2,300 feet and the northern about 1,900 feet in height, although it is said to have been mistaken for Kungwe, already mentioned.

Kipumbwe Reefs, the southern extreme of which is about 6½ miles east-southeastward of the north point of entrance to Mto Kipumbwe, from this occupy a space of about 7 miles north-northeastward by about 2 miles in width; they are of various sizes, with deep channels between them, some drying a few feet, others never uncovering, but all covered at high water, while the sea on the outer reefs almost invariably breaks. Another line of reefs, 2½ miles from the coast, extends parallel with the outer cluster.

Buoy.—A white spar buoy marked "Kpmbw" and surmounted by two triangles, bases apart, lies in 12 fathoms westward of the largest reef of the outer cluster, which dries 4 feet.

Inshore Channel.—There is a deep navigable channel entered from the southward to the westward of the Kipumbwe Buoy, with an average width of 2 miles between the two lines of reefs, and having smooth water even in a strong monsoon. It is useful to coasting craft as long as the buoy maintains its position, or when the reefs can be plainly seen.

For small craft beating to the southward against the southwest monsoon this channel, which is the continuation of the one from the northward, is invaluable, but when south of the reefs it is advisable to stand over to Zanzibar Island and beat down on that shore.

Pangani Bay Approach—South side.—Fungu Datcha, immediately north-northeastward of the extreme of Kipumbwe Reefs, is a coral reef that always breaks heavily when not awash; a shoal with a least depth of 1 fathom lies southwestward of Fungu Datcha.

Fungu Ushongu, lying 1¼ miles northwestward of Fungu Datcha, separated from it by a deep channel, is 1 mile in length, dries 11 feet at low water at its southwest end, and on its western edge is a white sand head covered only at high water, springs, and then the sea always breaks; its eastern edge is steep-to.

At 1 mile southward of the southwest extreme of Fungu Ushongu is a bank of small extent, with less than 1 fathom, and a narrow bank with a similar depth near its center, lies ½ mile south-southwestward of it.

Mwamba Makome, a narrow broken coral reef 1,400 yards long and awash at low water, springs, lies about ½ mile northward of Fungu Ushongu, with from 15 to 18 fathoms between; it does not always break, and is the only danger requiring more than ordinary caution when approaching the coast southward of Maziwi Island, especially as, at high water, with the sun ahead, it is difficult to make out.

Maziwi Island, on the western edge of a circular coral reef 1 mile in diameter and about 1¾ miles east-northeastward of Mwamba Makome, is small, sandy, and covered with casuarina trees, which are visible from about 15 miles; the reef dries 5 feet at low water, springs, on its outer edge, where the sea always breaks heavily. Maziwi Island is the resort of fishermen, and turtle frequent it during the season, February to July, and deposit their eggs.

Anchorage.—There is fair anchorage westward of Maziwi Island during either monsoon, with more protection than in Pangani Bay; the water is deep, but care must be taken not to anchor too close, as the reef is very steep. In the southwest monsoon a good berth is in 15 fathoms, over sand, with the north edge of the reef bearing 55°, and Maziwi Island, 91°. In the northeast monsoon a better berth is farther south, in 17 fathoms, sand, with Maziwi Island bearing 58°.

Mwamba Mawe, on the northern side of the approach from the eastward to Pangani Bay, is a coral reef 1,600 yards in length in a north-northeast and opposite direction, and moderately steep-to, which generally breaks at half tide, with a few heads drying about 2 feet at low water, springs; it is situated 4½ miles eastward of Ras Kikokwe, the southern point of entrance to Pangani Bay.

About ½ mile north-northeastward of Mwamba Mawe is Mawe Mdogo, a 2-fathom patch on which the sea seldom breaks.

Briton Shoal, about 1½ miles north-northeastward of Mawe Mdogo, has 4 fathoms least water and is steep-to, with from 7 to 19 fathoms between it and Mawe Mdogo.

South Head Reef, the south extreme of which lies rather more than 1 mile north-northeastward of Briton Shoal and about 3½ miles offshore, is of sand and coral, and, within a depth of 3 fathoms, about 3 miles in length, its northern half drying at low water; it is connected with Fungu Tongone northward of it by a 3½-fathom ridge.

Buoy.—A white spar buoy marked "South Head" and surmounted by two triangles, both pointing downward, lies in 14 fathoms on the southeast side of the southern end of South Head Reef.

Pangani Bay, on the western side of the northern entrance to Zanzibar Channel, is 2¼ miles wide, but so shallow that only very small craft can anchor inside the line of the points; nevertheless the anchorage just outside the bay is fairly protected from heavy seas by the outlying reefs, and Pemba and Zanzibar Islands break the ocean swell. Both sides of the bay are rocky and bordered with fringing coral ledges, backed by cliffs about 50 feet in height. The head of the bay is a straight sandy beach, which dries off 1,500 yards at springs from the southern end.

On nearing Pangani Bay, Maziwi Island is conspicuous, while inland the coast ranges show a tolerably uniform height of about 200 feet, and several miles within rise the picturesque peaks of the Usambara Mountains. Tongwe, an isolated, round, dome-shaped peak, 2,200 feet high, seen southward of them, and nearer the coast, must not be confounded with Genda Genda, 17 miles farther to the southward.

Inland of Pangani Bay a bare yellow patch on the steep face of the flat hill can be seen many miles when the sun shines on it from the eastward and marks well the position of the bay.

Directions.—The best approach to Pangani Bay is between Maziwi Island and Mwamba Mawe, and coming from the southward steer to pass about 1½ miles eastward of the former island until Tongwe Peak is in line with Bweni Bluff, bearing 297°, which leads about ½ mile northward of Maziwi Island Reef and to the anchorage off Ras Kikokwe. Should Tongwe Peak be obscured, a frequent occurrence, the reef of Maziwi Island is so plainly to be seen that the eye can with safety navigate clear of its steep edge.

From the northward, to avoid Mwamba Mawe, Maziwi Island should be steered for, bearing westward of 208°, until Bweni Bluff bears northward of 286°, when the bluff may be steered for.

For entering the bay close southward of Maziwi Island, no marks can be given, but it is safe and easy with the sun in a favorable position for seeing the reefs.

The approach along shore from the southward has been referred to with Kipumbwe Reefs; there is also an inshore channel within the reefs from the northward from Tanga, or a vessel may enter between the South Head Reef and Briton Shoal, but for any of these passages the chart must be the guide.

Anchorage.—The best anchorage off the bar is in a depth of 5 fathoms, over sand and mud, with Bweni Bluff bearing 285°, the northern side of Maziwi 138°, and the extreme land to the southward 208°.

Landing.—When the bar prevents access to the ordinary landing place in the river there is good landing, particularly in the northeast monsoon, at the northern end of the beach, under the lee of a rocky point, the best time to land being at high water.

Tides.—It is high water, full and change, in Pangani Bay at 4 h. 15 m.; springs rise 15 feet, neaps 10 feet.

Jipe Ruvu (Pangani River), one of the largest rivers on this part of the coast, rises in Kilimanjaro, one of the highest of the east coast mountains, at about 150 miles in a direct line from the sea, its course being through Yipe Lake; it is navigable for small craft between the lake and the Hohnel Cataracts, below which it has numerous tributaries, and many islands with villages on them, to the Pangani Falls, from about 1 mile below which it is clear, though shallow, to the sea.

For the first 6 miles from the entrance to Teufelsfelsen the southern bank is a dense mangrove swamp, extending back to the hills, but above Teufelsfelsen the mangrove swamp ceases and a beautiful and fertile country is reached; the northern portion is partially mangroves, and on this bank is Kovu Kovu Mount, 360 feet high, while abreast it on the south bank is a ridge 400 feet, from both of which good views of the river may be obtained.

Pombwe, one of the principal places on the river, is situated about 1 mile westward of Kovu Kovu, and above this the river runs between hills on either side, which in some places extend to the bank, while in others there are plains from ½ mile to 2 miles wide, mostly under cultivation, there being large sugar plantations, but during high river these are mostly flooded. Above Pombwe, the West African oil palm is met with, whilst below the trees are chiefly areca and coconut palms.

The river is highest about June and lowest about January, and it is tidal for a distance of 22 miles from the entrance, above which, except when the river is at its highest, the stream is not so strong, but boats can work their way up; the stream is apparently strongest above Koleni, within 5 miles off the falls, where the river is narrower.

Entrance.—From Ras Kikokwe, the southern point of entrance to the bay and river, which may be known by the white houses of Mbera settlement on its south and other buildings on its east side, the south shore has a northwest direction for about 1¼ miles to Ras Muhesa, on which is a large white house, the shore between forming a bay with a coral reef drying out to the line of the points; about 1 mile westward of Ras Muhesa is Bweni Bluff, perpendicular, about 200 feet high, and conspicuous from seaward.

The northern side of the entrance is a flat sandy beach, behind which is Pangani town, with an extensive grove of coconut palms to the northward of it.

Bar.—The bar extending about ¾ mile seaward of Ras Muhesa, along the edge of the drying coral reef above mentioned, varies in depth and probably changes its position with the season, and with an in-going stream and a moderate breeze is usually smooth, but with the outgoing stream, especially at springs, it is frequently dangerous for boats. About June, when floods in the interior are common, the outgoing stream runs with great velocity; within the bar and abreast the town the width is about 350 yards.

Depths.—The depth on the bar at low water, springs, was 4½ feet in the autumn of 1893, and at high water a vessel of 13 feet draft can enter; within the bar, abreast the town, the depths are from 12 to 15 feet, and above this they are not less than 6 feet for 11 miles, to Pombwe, but from that to Chogwe, 4 miles farther, there are less than 3 feet in places at low water, springs, although, as far as tidal influence extends, small vessels can pass the shallow places toward high water.

Above Chogwe the depth in the channel during the dry season is not less than 3 feet until within 1 mile of Pangani or Margarethen Falls, about 45 miles from the entrance, and probably vessels drawing 2 feet can reach this point at all seasons.

Signal station.—The signal station at Ras Muhesa is an octagonal stone tower by the side of a large white house and has a flagstaff close to it.

Beacons and buoys.—On the northern point of entrance to the river are two wooden beacons, with triangular topmarks.

The fairway buoy of the bar is a black and red buoy, with spar work upper part, and "Pangani" in white letters on it; it is surmounted by a black ball.

A black conical buoy, with "1/Pangani" on it in white letters, lies within, on the south side of the bar.

Directions.—When the leading beacons can be clearly distinguished from the group of coconut palms they should be steered for, leaving the two buoys a short distance to the southward, and then for mid-channel of the entrance to the river.

Anchorage.—The Government steamers anchor in a depth of 15 feet high at high water, springs, in the middle of the river, opposite the customhouse.

Town.—Pangani, situated on the low strip of sand on the north side of the entrance, is surrounded by coconut palms and fronted by mangroves, its general surroundings tending to make it unhealthy; it has a number of stone houses and a population of about 3,200. The customhouse is a white stone building with a tower, veranda, and two turrets, and there is a fort, a district office, and a garrison. Bweni village is situated on the opposite bank of the river, near the bluff of the same name; Pombwe village has several stores.

Communication.—A post office, with telegraph and telephone, is situated in the village.

Supplies.—Bullocks, sheep, fowls, eggs, goats, fruit, and vegetables can be procured; water is obtained from a well close to the bank; it has a pump to which a hose can be attached, so that boats can procure a supply, but the water is brackish.

Trade.—Considerable trade is carried on with Zanzibar and Pemba, dhows loading and discharging in the river, and a large quantity of sugar is grown in the district, in addition to maize, manioc, yams, pumpkins, rice, tobacco, coffee, mangoes, citrons, guavas, and other fruits; the areca and oil palms, as well as coconut palms, grow in the district, and ivory and copal are exported, the produce being brought down the river on rafts.

Zanzibar, the largest and most important of the many coralline islands bordering the east coast of Africa, is the center of most of the trade between this coast and the Arabian and Indian ports by sea as well as that with the central parts of Africa by land; it is 47 miles in length in a north and south direction and has a maximum width of about 20 miles between the town of Zanzibar on the western side and Chuaka Head on the east.

The island is 440 feet high northeastward of the town, but from 150 to 200 feet in most other parts; it is undulating, the principal ridges running north and south with plains between, which, in several instances, show a coralline surface worn into little points and ridges, also noticed on the ledges around the island at low tide. It stands on a coral flat widest on the seaward side, the result of the action of the waves on the original steep, though low, cliffs, which probably surrounded the island, and at high water still, in most places, border it.

Except at a few spots and in the inlets this coral flat is very steep-to, dries from 1 foot to 2 feet at low water, and has a rather higher outer edge than its average height, but it is level; the small reefs of the adjacent channel and coast are of precisely the same character, and some having islands on them will doubtless in time become sand heads of broken coralline, or afterwards flat coral reefs, completely covered except at low water, springs, although this latter stage is not always reached.

Parts of the island are extremely fertile, and even in places where the soil is sandy all tropical cereals and edible roots grow in extraordinary profusion. The island possesses several good anchorages on its western side, but that of Zanzibar, or Unguja, the principal town, is the only one frequented by vessels engaged in ocean traffic; the eastern coast is unindented except by Chuaka Bay, which is too shallow to be useful for shipping.

Tides.—The tidal wave coming from the eastward makes the times of high water at full and change nearly identical for all this coast, only varying a little on either side of 4 h. 10 m. In Zanzibar

Channel the great difference between neap and spring ranges, the latter being generally 15 feet, and the former 5 feet, makes a considerable difference in the appearance of the reefs and shores both of the mainland and island, especially in the case of the large area of coral banks in the neighborhood of Zanzibar town, and this should be constantly remembered, and any passages new to the navigator should be taken, if possible, at low water.

It is high water, full and change, at the south end of Zanzibar Island at 4 h. 20 m.; springs rise 15 feet, neaps rise 10 feet. At Zanzibar and the north end of the island it is high water at 4 h. 15 m., the spring and neap rise in both places being the same as at the south end of the island.

Tidal streams.—The stream of the rising tide sets to the northward in the southern part of Zanzibar Channel, and in a contrary direction at the northern end, thus meeting at high water at a point near the center, the position of which depends much upon the direction and strength of the wind; the other stream sets in the reverse way from the central point of meeting, toward the northern and southern ends of the island. During the northeast monsoon the streams are weak.

The direction of the streams at the anchorage of Zanzibar is extremely variable, as they meet near there. In the southwest monsoon, off Ras Shangani, the stream runs chiefly northward at all times of tide, but a vessel anchored under the lee of the point lies in the eddy, and may swing in any direction.

Currents.—In the southwest monsoon, off Bawi Island, and through the Great Pass, the direction of the current is always northward. In Zanzibar Channel it is variable; in the fairway it runs continuously northward, but amongst the reefs and island the tidal streams affect it, particularly at springs, and in the northeast monsoon, when at springs, in all small channels and harbors, it overcomes the northerly current.

In attempting to forecast the direction of the set in any part of Zanzibar Channel, the navigator must take into consideration the age of the moon, with its resulting strength of tidal stream, the direction and force of the monsoon, and the contour of the land, forming the best conclusions from these data.

Outside Zanzibar Island the current always sets to the northward, its rate varying from 1½ to 4 knots in the southwest to from 1 knot to 2½ knots in the northeast. monsoon. This current runs thrugh the passage between Pemba and Zanzibar Islands, and up Pemba Channel, at about the same rate.

Winds.—The southwest monsoon, known as the Masika season, sets in about March, bringing the heaviest of the rains, and is strong for two months or more, rain being always prevalent, but by July or

August the wind settles down to a steady breeze, and the rain clears off, and this continues until October, when the southwest wind gets fitful and uncertain, and rain and squalls may again be expected.

By the end of November the northeast monsoon sets in, sometimes quietly, sometimes with a burst, and, after an interval of a fortnight, blows steadily until February, when it begins to die away, but these seasons are so uncertain, and subject to such variation, that any description can be only an approximation.

Near the land the monsoons do not blow steadily in one direction. During the southwest monsoon, and especially in the Zanzibar Channel, it is usual in the morning for the wind to be from west or southwest, freshening up to 10 a. m.; after that it falls lighter for a time, but, hauling around to the southward, freshens up again about 1 p. m., finishing in the evening at southeast; when this takes place the weather is usually fine. If the wind does not commence at west in the morning, and yet veers to the southward, there is more chance of rain, but squalls, and occasionally rainy days, may be expected all the year round.

After the northeast monsoon is well established, the wind in the morning is generally north-northeast, veering to east-northeast about 2 p. m.

Cyclones are unrecorded prior to 1872, but in April of that year one swept over the island from the northeastward, destroying everything in its path, but leaving the southern end untouched.

Zanzibar Channel—Southern Approach—Directions.—Mariners may enter or leave Zanzibar by either entrance using the ordinary route. A vessel from the southward and eastward, bound to Zanzibar during the southwest monsoon, should endeavor to make Ras Mkumbi Light, the northern extreme of Mafia Island, in preference to Ras Kizimkazi, the southern point of Zanzibar Island, in order to make sure of clearing Fungu Kizimkazi. The north-going current, though generally strong, is so variable that great caution is necessary.

Give Ras Mkumbi a berth of at least 3 miles, and when northward of it steer straight for Ras Kimbiji, with the expectation of making not much to northward of the vessel's course. The coast about Ras Kimbiji is clear of danger, the land is the highest for some miles in the vincinity, and the light on Ras Kanzi is a useful aid. Northward of Ras Kimbiji the current against strengthens as Zanzibar Channel opens.

In the northeast monsoon a vessel should be guided by circumstances; the north-going current is still continuous, and a sailing vessel had better pass outside Zanzibar Island and enter with a fair wind by the northern pass; a steam vessel may either do so or steer directly for Ras Kizimkazi.

Ras Kizimkazi, or the land at its back, which should be sighted in clear weather at a distance of about 15 miles, has nothing remarkable in its appearance, which is that of a long, low, wooded hill, and a course should be steered to keep it on the starboard bow until Pungume Island is seen. Ras Kizimkazi should be given a berth of about 4 miles, or the extreme of the point should not be brought eastward of 60° until Pungume Island bears about 343°, when a vessel may steer 322°. Hatajwa Hill well open westward of Pungume Island about 343°, leads westward of Pungume Patches and Moore Bank.

When this mark is open, steer to pass 1½ miles westward of Pungume and Kwale Islands.

West coast.—Ras Kizimkazi, the southern point of Zanzibar Island, appearing as a long, low, wooded hill, is so rounded that the appearance of the land alters with every change of a vessel's position; at its southwestern extreme is a small sandy bay and a cliff 15 feet high, backed by gently rising ground covered with dense bush, the tops of which, from 70 to 100 feet high, may be seen from a distance of about 15 miles. Part of a tower 12 feet high standing near the point, and originally intended for a lighthouse, appears as a ruin.

The fringing coral ledge dries off Ras Kizimkazi for a distance of 1,600 yards to a steep edge on which the sea breaks heavily, and a sand bank near the edge dries 5 feet at low water, springs; southward of the point the 20-fathom contour line passes about ½ mile off.

The cliffs are undermined, and landing is impracticable on this part of the coast.

Current.—The current sets northwestward past Ras Kizimkazi at all times, with a velocity of about ¾ knot, its greatest strength being during the southwest monsoon, and with the rising tide.

Coast.—From Ras Kizimkazi the western coast, which is of alternate cliffs and sandy bays, trends north-northwestward for 5 miles, to Mchanga Mule, on the east side of the entrance to Peete Inlet, and is fringed by a coral bank which dries off from 400 yards to nearly 1 mile.

Peete Inlet, 1½ miles in width at its entrance, between Ras Bweni and Mchanga Mule, extends 6 miles northward, and is nearly all dry at low water, springs, except a narrow channel up its center. The western side of the inlet is formed by Wundwi and Uzi Islands, and the head is lost in mangrove swamps, through which, at high water, there is a passage for canoes northward of Uzi Island into Menai Bay. Ras Bweni, the southern point of Wundwi Island, is rocky.

The depths in the entrance to Peete Inlet are from 3 to 5 fathoms, and the same in the channel, until nearing the head, where they decrease to 1 fathom.

Menai Bay, a large sheet of water, the outer part formed by the outlying Islands of Pungume and Kwale with their reefs, and the inner part by a deep indentation in the main island, is about 12 miles long, with an average width of 3½ miles. The eastern shore from Ras Bweni is low, with small cliffs, sandy beaches, and a fringing coral ledge, which dries off in places to about 1,600 yards.

The head of the bay is lost in mangrove swamp, and is divided by a narrow island into the two smaller bays of Kiwani and Kumbeni. Mto Mwera, one of the largest streams in Zanzibar, falls into the bay, or rather loses itself in the mangrove swamp.

Depths.—The depths in the entrance to Menai Bay, between Ras Bweni and Pungume Islet, are from 13 to 16 fathoms, decreasing to from 6 to 9 fathoms near Niamembe and Miwi Islets.

Anchorage.—The chain of islets and reefs extending southward to Pungume Island shelter the outer part of the bay, and good holding ground in from 12 to 15 fathoms may be found anywhere in this part; but, in the strength of the southwest monsoon, sheltered anchorage can only be obtained northward of Pungume Island or between Niamembe and Miwi Islets; a small vessel may proceed still higher up the bay, off the small islet of Sumi, and anchor in about 6 fathoms, but at this part of the bay begins to shoal and the navigation becomes intricate; so that the eye and chart must be the guide.

Pungume Island, the western point of entrance to Menai Bay, and the first of the chain of small islands forming the eastern side of Zanzibar Channel, is formed of coral, 1½ miles long by ½ mile wide, and stands on the southern part of a coral reef 2½ miles in length. The island is cliffy, and covered with trees, the tops of which are about 40 feet high, and on its eastern side is a sandy beach, off which on the edge of the coral reef is an islet very conspicuous from the southward.

Two islets lie on the reef extending northward from Pungume Island, also a sand cay, which only covers at or near high water, springs, near the northernmost point of the reef, 1 mile from Pungume Island; a 4-fathom ridge connects this sand cay with Kwale Island to the northwestward.

Pungume Patches, westward of Ras Kizimkazi, and south-southeastward of Pungume Island, are several banks lying in the fairway of vessels bound to Zanzibar Harbor. Bedford Bank, the southernmost, being nearly 2 miles in extent within a depth of 10 fathoms, with one small patch of 5 fathoms, steep-to all round; it lies 6½ miles south-southeastward of Pungume Island.

Moore Bank, about midway between Bedford Bank and Pungume Island, is smaller, has a depth of 3 fathoms, and is steep-to; a large patch with from 3 to 5 fathoms lies 2½ miles east-northeastward of Moore Bank.

Clearing marks.—The bottom will be plainly seen when near the Pungume Patches, but a near approach should be avoided by deep draft vessels. Hatajwa Hill well open westward of Pungume Island bearing 343°, or the island bearing northward of 355°, leads westward of all these patches; and the extreme of Ras Kizimkazi bearing northward of 60° leads southward of them.

Anchorage.—Convenient night anchorage for small vessels, especially during the northeast monsoon, may be found on these banks.

Kwale Island, a low, rocky, scrub-covered island, the highest trees of which are about 30 feet high, lies nearly 3 miles northwestward of Pungume Island on a reef which uncovers at low water, springs, and is always visible; the reef is steep-to on its eastern and western sides, but shallow water extends some distance northward and southward from it.

On the northern end of Kwale Reef is a sand cay, drying 1 foot, and separated from the coral ledge which dries for 2-miles southward of Ras Fumba, by a narrow 6-foot channel much used by small craft and boats working along the shore. Pamuda, Miwi, and Niamembe Islets all lie eastward of the northern end of Kwale Reef, the two last in mid-channel to the entrance to the head of the bay.

Anchorage.—There is temporary anchorage between Pungume and Kwale Islands in a depth of 7 fathoms, with Pungume North Islet bearing 78°, and the northwestern point of Kwale Island 327°.

Kipwa Gini, a small coral head with 1¾ fathoms over it, lying about 1¼ miles west-southwestward of the sand cay on Kwale Reef, is not easily seen, but Hatajwa Hill bearing eastward of 5° leads westward of it.

Kumbeni Peninsula, forming the western side of the head of Menai Bay, is a flat well-cultivated tract of land about 40 feet high, Ras Yeketekambe and Ras Fumba being the eastern and western extremes of the southern end of the peninsula. Hatajwa Hill, 3¼ miles northward of Ras Fumba, is 206 feet high, conspicuous, isolated, and rounded; it is a mass of coralline rock, rising from the level plain around, its deeply cave-worn sides and base pointing to it having been at one time an islet in the sea undermined by the waves, other similar instances of this occurring in Zanzibar Island.

Coast.—From Ras Fumba the west coast of Kumbeni Peninsula trends northwestward for 5½ miles, to Ras Buyu; it is low, and faced by a coral reef about 600 yards in width. Chugwani Palace is northward of Ras Buyu, and from it an electric light is shown occasionally.

Mwamba Ukombi, two reefs nearly joined together, lie 1½ miles off Kumbeni Peninsula, and parallel with the coast for a distance of 4½ miles; they dry in patches at low water, springs, and are steep-to and easily seen from the masthead. On the northern reef are three rocky islets about 10 feet in height, Ukombi being the northernmost, and the other two named the Tali Islets.

Shoal water, with less than 5 fathoms, extends more than 1 mile south-southeastward of the reef, with a 3-fathom patch on it, and the 5-fathom contour line is about ¾ mile northward of the reef, inclosing a 2-fathom patch.

Chumbe Island, ½ mile long in a north-northwest and opposite direction, with overhanging low cliffs, is covered with trees 45 feet high, very similar to Kwale Island. The island stands on Mwamba Chumbe, a reef, the southeast extreme of which is about 1,200 yards northwestward of Mwamba Ukombi, from which it extends nearly 2½ miles northwestward; it is steep-to, discernible from aloft, and dries in patches at low water, springs.

Light.—On the west side of Chumbe Island is a white, square tower, 113 feet in height, which exhibits at an elevation of 120 feet above high water a flashing white light, visible 17 miles. (For bearings of arc of visibility, see Light List.)

Coast.—From Ras Buyu to Ras Shangani, on which stands the town of Zanzibar, a distance of about 5½ miles, the coast is formed principally of low cliffs, with white sandy bays at intervals, the land behind being covered with trees. Ras Chukwani is 1½ miles northward of Ras Buyu, and from the former to Ras Mbweni, a similar distance in the same direction, the coast is low, but northward of Ras Mbweni are red cliffs, followed by white cliffs, from 50 to 70 feet high.

The red cliffs near Ras Buyu are the highest and most extensive, but are not generally so conspicuous as those at Ras Mbweni, which, from their brighter color, are usually the first noticed. Mbweni House, an Anglican Mission, is situated a short distance to the southward of Ras Mbweni, and nearly midway between that point and Ras Shangani is the Anglican Mission at Kiungani, a square white three-storied building with a flagstaff, forming another conspicuous object, but with the morning sun it is difficult to make out any feature of this coast.

Leading lights.—Two fixed white lights for the southern pass are shown from beacons situated near Kiungani, the rear beacon, 42 feet in height, being situated close southeastward of the mission.

The front light is exhibited, at an elevation of 30 feet above high water, from a square iron framework tower 43 feet high, white on the seaward side with a black vertical stripe, standing on the reef fronting the coast, 1,100 yards 213° from the rear beacon; the front light is visible 8 miles.

Ras Shangani is the rounded sandy termination of the lowland projecting slightly from the general line of coast and having on it the town of Zanzibar, the houses of which, from their dazzling white-ness, are visible from 5 or 6 miles to the southward of Chumbe Island and about 10 miles northward of Chapani Island.

Southward of the point is the British residency, a white building with a red roof and having a castellated tower with a flagstaff at its southern end. Near the extremity of the point is the Government hospital, a large square building used as a leading mark.

Lights.—A fixed red light, visible about 1 mile, is shown from the head of the British consulate pier, and two fixed red lights are exhibited from the landing place to the southward of Ras Shangani, while from the landing place to the northward of the same point a fixed green electric light is shown; red lights are also shown from the Government hospital pier and from the pier extending from the oil reservoir.

Coast.—About 1 mile northeastward of Ras Shangani is the entrance to Pusani Ndongo, a salt-water inlet or lagoon, which dries at low water, but at high water nearly converts the town into an island, being only separated from the sea to the southward of the town by a low, sandy, and coral ridge known as Mnazi Moja; about ½ miles northeastward of the entrance to the lagoon is the Marhubi Palace.

Leading lights.—Two fixed white leading lights, for the English Pass, are exhibited from white square stone towers 42 and 20 feet in height, respectively, and situated immediately to the northward of the Marhubi Palace; the lights are 389 yards apart and in line bearing 168°.

Bet-el-Ras is about 1½ miles northward of Marhubi Palace, and at about one-third of the distance is Mtoni village, where there is a palace in ruins on the beach, with a small white house close to it, which is used as a leading mark; an open aqueduct of fresh water, from a spring named Chim Chim, about 1 mile inland, is used by the natives for washing themselves and their clothes, thus rendering it unfit for use. Bet-el-Ras is a low, rocky point, having on it the ruins of a large and very conspicuous white castellated palace, with a portico to the north.

About 1½ miles within this coast the land rises to a range of hills 440 feet high and trending parallel to it; on this range are several clumps of trees, two of which, near the northern end of the range, are used as leading marks.

Malindi Spit, which fronts the entrance to the lagoon, where it extends ½ mile offshore, dries from 2 to 7 feet at low water, springs, but farther northeastward it gradually closes the coast, and Bet-el-Ras is fringed by a reef, extending nearly ¼ mile.

Leading lights.—Two fixed white leading lights, which in line clear Malindi Spit and the drying bank northeastward, are shown from beacons 42 and 20 feet in height, respectively, situated close south-southeastward of Bet-el-Ras; they are 214 yards apart and are in line bearing 42°.

Coast.—From Bet-el-Ras the coast trends to the northward with slight indentations, sandy bays, beaches, and low rocky cliffs for 13 miles to Ras Oswawembe, the northwest point of the island, the land behind rising gently, being well cultivated, and covered with trees; the 5-fathom contour line is only about $\frac{1}{3}$ mile off this coast, so that vessels can keep near it and thus avoid the outlying dangers.

Bububu Palace, a white house with a dome near it, is about 1 mile northward of Bet-el-Ras and near the mouth of a small stream, where an aqueduct brings water to the sea, but should not be used for drinking purposes for the same reason as at Mtoni.

Mungopani village is about $5\frac{1}{2}$ miles to the northward of the Sultan's palace, and about 2 miles farther north is a cliffy point.

Light.—On the cliffy point to the northward of Mungopani village is a white square tower, 76 feet in height, and having a red base; it exhibits, at an elevation of 116 feet above high water, a fixed white light, visible 14 miles.

Telephone.—The lighthouse is connected with the town of Zanzibar by telephone.

Zanzibar Harbor, the space fronting the town and the coast on either side of it may be said to extend about 3 miles to the southward of Ras Shangani and about 2 miles northeastward of the same point, while its width abreast the point is about 2 miles, gradually narrowing to the southward and northeastward.

The depths in the southern portion are from 6 to 11 fathoms, abreast the town from 8 to 13 fathoms, and in the northeast portion from 7 to 10 fathoms.

A patch of $4\frac{1}{2}$ fathoms surrounded by depths of 6 fathoms lies 3° distant about 600 yards from Ras Shangani, and 300 yards eastward of the $4\frac{1}{2}$-fathom patch is one of 3 fathoms outside the contour line of that depth.

Piers.—A pier extends about 200 yards southwestward from the shore southeastward of the British consulate, and between it and Ras Shangani are several shorter piers.

Approaches to Zanzibar Harbor.—Zanzibar Harbor, the excellent anchorage fronting the town, is approached through six passages between the reefs, the Inner and the Southern being from the southward, the Western Pass from the westward, and the Great Pass, the French Pass, and the English Pass from the northward.

Inner Pass, between Kwale Island and Kumbeni Peninsula, on the east and Mwamba Ukombi and Mwamba Chumbe on the west is about 9 miles in length, $\frac{1}{2}$ mile in least width, and is greatly used by dhows to avoid the current. Another pass between Mwamba Ukombi and Mwamba Chumbe is the same width as the narrowest part of Inner Pass, and communicates with its northern portion.

Depths.—The depths at the southern entrance to Inner Pass are from 6 to 9 fathoms and are continued through the pass until abreast of Ras Buyu, where, at the narrowest part, they are from 5 to 6 fathoms.

As both these channels must be navigated by the eye, no directions can be given.

Southern Pass.—The southernmost danger, when entering this pass from the southward, is Ariadne Bank, which may be passed on either side, and from this the dangers on the east side are Mwamba Chumbe and Mtwana, westward of Ras Chugwani.

On the northwestern and western sides of the pass are Boribu, Tambare, and a detached reef westward of it, Pwakuu and Nyange, with their surrounding reefs, and Kisiki, Pange, and Fungu Chawamba, the narrowest part of the pass being between the west side of Mtwana and the shoal extending southward of Kisiki.

Depth.—The least depth in the channel is 6 fathoms, at its narrowest part, about 150 yards in width between the 5-fathom contour lines.

Dangers.—**Ariadne Bank,** about 600 yards in length, with 2¾ fathoms least water, and steep-to, lies in the fairway of the Southern Pass, and can be seen from aloft; it lies nearly 2¾ miles southwestward of the southeast extreme of Mwamba Chumbe, and may be passed on either side.

Clearing marks.—The Government Hospital on Ras Shangani, well open eastward or westward of Chumbe, bearing about 2° or 7°, respectively, leads eastward or westward, and to pass northward or southward keep Hatajwa Hill open northward or southward of the Tali Islets bearing 55° or 47°, respectively.

Eastern side.—Mwamba Chumbe, on the eastern side of the pass, has been described.

Mtwana, forming the eastern side of the narrows of the pass, is a three-headed shoal from 1¼ to 1¾ miles westward of Ras Chugwani; the southern head, 1¼ miles west-southwestward of Ras Chugwani. has 2½ fathoms, the eastern head has 1 fathom, and the western head 1¾ fathoms. Two banks, with from 4 to 4½ fathoms, and steep-to, lie from ½ mile to 1 mile south-southwestward of the western patch, and should be given a berth.

Lightbuoy.—A red lightbuoy, exhibiting a fixed red light, is moored in a depth of 6 fathoms less than 400 yards westward of the western head of Mtwana.

Western side.—**Boribu,** a reef on the western side of the approach to the Southern Pass and 5¼ miles westward of the Ariadne Bank is 1,800 yards in length in a northwest and opposite direction, dries 3 feet at low water, springs, and has on its northwestern end a small white sand head which dries 8 feet.

Tambare, lying 2 miles northward of Boribu, is an isolated coral reef 1¼ miles in length, steep-to, and generally to be seen; the sand head on its northern extreme dries 11 feet at low water, springs; other parts dry from 4 to 6 feet.

Outer Tambare, 1½ miles westward of Tambare Sand Head, is a coral patch with 1¼ fathoms least water, and always discernible.

Pwakuu, nearly 3 miles long in a northwest and opposite direction, and 1¼ miles wide, lies 1¾ miles north-northeastward of Tambare Sand Head, and has a large sand bank on its western part, drying 10 feet at low water, springs; the rest of the reef dries at different times of tide. A channel ½ mile wide, with depths of 6 to 12 fathoms, and a rocky path in midway, separates Pwakuu from Nyange Reef to the eastward.

Nyange, a reef 3 miles long, 1½ miles wide, and steep-to on its southern and eastern sides, has a sand head on its north extreme drying 11 feet at low water, springs, and which is generally visible; the remainder of the reef dries 3 feet in places. It is about 2½ miles northwestward of Chumbe, on the northwest side of the pass, and may be sighted soon after passing that island.

Kisiki, lying 1¼ miles northward of Mtwana and $1\frac{4}{10}$ miles westward of Ras Mbweni, is a coral patch just awash at low water, springs, but having a sand bank on its north extreme which dries 3 feet, and shows so white that the bank is generally to be seen at any time of tide.

A shoal tongue, with patches of from 2¼ to 4½ fathoms, extends southward from Kisiki, narrowing the available channel at low water, with a depth of 3½ fathoms to about 700 yards, but for vessels of deep draft the channel is scarcely more than 200 yards wide, with a depth of 6 fathoms.

Buoy.—A black can buoy, moored in 5 fathoms, marks the eastern side of the 2¼-fathom patch on the tongue of Kisiki, the tongue extending about 650 yards southward of the buoy.

Pange, about 1¾ miles in length in a west-northwest and opposite direction, is composed of coral, with a large sand bank near its center, which dries 15 feet at low water, springs; it lies about 200 yards northwestward of the northern part of Kisiki, separated from it by a narrow channel with 6 fathoms water.

A patch of 1¾ fathoms lies about 800 yards northward of the drying sand bank on Pange.

Directions.—To proceed through the Southern Pass, and being about 2 miles westward of Pungume Island, if intending to pass eastward of the Ariadne Bank, and to avoid Kipwa Gini, steer 318°, keeping the south extreme of Pungume bearing eastward of 126°

until Hatajwa Hill bears eastward of 11°, then steer so as to pass about 1,400 or 1,600 yards westward of Chumbe Island.

To pass eastward of Ariadne Bank the Government Hospital on Ras Shangani should be kept well open eastward of Chumbe Island, bearing about 2°, or the southern end of that island bearing northward of 2°, until Hatajwa Hill is open northward of the two Tali Islets, bearing about 55°.

To pass westward of the Ariadne Bank the Government Hospital should be well open westward of Chumbe Island, bearing about 7°.

From abreast of Chumbe Island steer about 343° until the leading beacons at Kiungani are in line bearing 33°, when steer for them, passing westward of the lightbuoy marking Mtwana, and then keeping somewhat eastward of the leading line to avoid the shoal patches on the southern tongue of Kisiki.

When Ras Buyu and Ras Fumba are in line bearing about 138°, the vessel will be through the narrows, and may steer for Ras Shangani, rounding it at from 600 to 800 yards for the anchorage northward of it.

By night.—The light on Chumbe Island bearing westward of 0°, or eastward of 10°, leads eastward or westward of Ariadne Bank, after passing which steer about 345° to pass about ¾ mile westward of Chumbe Island Light, continuing the course until the lights at Kiungani come in line 33°, when steer for them, passing close westward of the lightbuoy, and after keeping to the eastward to clear the patches, a course about 5° should lead to Ras Shangani.

Western Pass, entered about 4 miles northward of Pwakuu, passes between Fungu Mapape, Murogo, and Fungu Chawamba on the south, and Bawi Island, with its reef and detached patches eastward of it, on the north; at its inner part it is divided into two by a 2½-fathom patch in mid-channel, the fairway on either side of it being barely 200 yards wide.

Several submarine telegraph cables are laid through this pass, therefore vessels should avoid anchoring in any part of it.

Depths.—The depths in the entrance are from 18 to 19 fathoms, gradually decreasing to the 10-fathom contour line, which passes westward of Fungu Chawamba. The depth is 5½ fathoms in the channel to the southward, and 6 fathoms in that to the northward of the 2½-fathom coral patch in mid-channel.

Dangers—South side.—Fungu Mapape and Mwamba Mapape are two reefs on the southern side of the entrance to the Western Pass, occupying a space about 2¼ miles in a north and south direction, and with a channel upward of 1 mile wide, and depths of 12 or 13 fathoms between them and Murogo Reef, and a 4-fathom channel between them; at low water, springs, they dry with white sand heads 6 and 4 feet, respectively.

Murogo Reef, about 1½ miles long in a north and south direction, lies between the Mapape and Pange Reefs, with wide and deep channels on either side of it, safely navigable by the eye; a large sand bank on the reef generally shows, drying 8 feet at low water, springs.

Fungu Chawamba, 1½ miles eastward of Murogo Reef, only uncovers 4 feet at springs; it is steep-to, and generally to be seen, especially as a wreck of a steam vessel on its northwest end is likely to form a conspicuous object for some time.

Northern side.—Bawi, a low island covered with scrub and a few coconut trees, on the northern side of the entrance to the Western Pass, with its reefs, forms the western protection to Zanzibar Anchorage. It lies 3 miles westward of the town on a reef which extends 1 mile southwestward of it, and dries at low water, with sand patches which dry 6 feet at low water, springs.

Northward of the island a ridge with less than 1 fathom connects it with Mwamba Bawi, which consists of a narrow strip of sand, drying 6 feet at low water, springs, on a coral reef 1,600 yards long in a northwest and opposite direction.

Patches.—From ¾ mile to 1½ miles southeastward of Bawi Island are three coral patches, the northernmost having less than 1 fathom, the middle patch awash, and the southernmost, with 2½ fathoms, which is very small, lying in the very center of the Western Pass.

Directions.—In consequence of the 2½-fathom mid-channel patch, large vessels using this pass, after rounding Bawi Island Reef, should pass northward of all three patches mentioned, steering about 30° up the eastern side of Bawi Reef until the Sultan's palace bears 102°, when steer for it until within 1,000 or 1,200 yards of Ras Shangani, and then for the anchorage as may be desired. It is not advisable to use this pass except with a good light for seeing the reefs and banks.

Northern Approach—Dangers.—Yambwa Ngome consists of two reefs nearly 1½ miles apart, the western of which, situated 4½ miles from the Zanzibar shore and 10½ miles north-northwestward of Ras Shangani, is a flat coral reef awash at low water, with a small head which dries 8 feet at half tide; it is 800 yards long in a north and south direction, 400 yards wide, and steep-to all round.

The eastern reef, eastward of the western, is similar to it but somewhat longer, and dries 2 feet only at low water, springs; it is about 3 miles from the Zanzibar shore, with from 16 to 19 fathoms between.

Fawatu, a reef with its northern end of 3 fathoms, situated 1½ miles southward of the western Yambwa Ngome, is 2¼ miles long in a north and south direction, with a general width of 400 yards, but one-third from its southern end it suddenly expands to about 1,400 yards. It dries in patches, especially near its extremes, but about 1,200 yards from its southern end a sand bank dries 9 feet at low water, springs; the reef is easily seen, but must be approached with caution, especially on its western side.

Passes.—The northern boundary of Zanzibar Harbor is formed by three islands with their reefs, extending in a westerly direction from the coast at Mtoni village, and between these are the three passes before named, viz, the Great, the French, and the English; of these only English Pass is buoyed, beaconed, and lighted, and is that commonly used.

Great Pass, the widest and deepest of the passes leading into Zanzibar Harbor from the northward, passes between Chango Island and its reef on the east and Danzi, Mwamba Bawi, and Bawi Island and Reef on the west; having neither buoys nor leading marks, it is not considered such a good channel as English Pass.

Depths.—The depths in the entrance to the pass are from 14 to 16 fathoms, which are continued to nearly abreast Bawi Island; after that they are from 7 to 8 fathoms on a shoal bank connecting Chango Island with Fungu Chawamba.

Dangers—East side.—Chango, an island 20 feet high, and about 800 yards long in a northwest and opposite direction, has reef extending all around it for about 375 yards, and shallow water stretching nearly 2 miles to the southward and 1,600 yards to the northward, a rock nearly awash lying close to its northern end. A tongue, with from 3½ to 5 fathoms over it, extends southwestward from this rock about 1,600 yards into the Great Pass.

Quarantine station.—The quarantine and isolation station is a large building standing in a central position on the northern shore, and two Government bungalows, with a flagstaff, are at the eastern end of the island, all becoming conspicuous when approaching from the northward.

Beacons.—A white staff and triangle stands on the southwest side and a white post on the beach of the island; when in line bearing 226° they lead into the anchorage on its northeast side.

West side.—**Danzi**, the outermost danger on the west side, and 1½ miles northwestward of Chango, is a small coral reef, awash at low water, springs, with a bank having depths under 3 fathoms, ½ mile northward and 400 yards westward from it; it lies toward the north end of a narrow bank under 10 fathoms, extending about 3 miles north-northeastward of Mwambi Bawi, and having on it, at about ½ mile from that reef, a patch of about 800 yards in extent with a least depth of 1½ fathoms.

Directions.—The eye and the plan are the only possible guides for this channel.

French Pass, between Chango and Kepandiko Islands, with their surrounding reefs, is also unbuoyed and has no leading marks; its width between the 2-fathom contour lines of the banks on either side is not more than 100 yards.

Depth.—The least depth in the channel at low water, springs, is about 4¼ fathoms, and no directions can be given for it, as the eye and plan must be relied on.

Kepandiko, an islet less than 200 yards in extent, lies on a reef about ¾ mile in length in a north and south direction, and drying 4 feet at low water, springs; the reef is surrounded by a bank under 2 fathoms, which extends about ¼ mile westward of it toward the east side of French Pass.

Chango, already described with Great Pass, has a bank under 2 fathoms, extending eastward and forming the west side of French Pass.

English Pass, the entrance generally used by vessels from the northward, leads up to and through the narrow curved channel between Chapani Island and the shallow water bordering the Zanzibar shore. Although Chapani is more than 1 mile from the shore, a bank under 2 fathoms extends about ⅔ mile eastward of it, and, with that extending from the shore abreast, narrows the width of the available channel to 400 yards.

Depths.—The depths in the entrance are from 8 to 10 fathoms, and from 6 to 9 fathoms in the narrowest part of the pass.

Seagull Shoal, lying in the direct approach to English Pass from the northward, is small and formed of black sand and coral, with a least depth of 1½ fathoms, and 4 to 8 fathoms around; it lies 2⅓ miles north-northwestward of Bet-el Ras.

Buoy.—It is marked by a checkered black and red can buoy on its southern edge.

The clock tower, in the middle of the Government offices at Zanzibar, on with the western end of Chapani Island, bearing about 180°, leads just eastward of the Seagull Shoal.

Dangers—East side.—Northward of Bet-el Ras the shore bank, under 3 fathoms, extends off about ½ mile, and from the point itself reef and shore bank extend about half that distance; the eastern side of the narrows is formed by drying bank continued by shore bank and stretching off 700 yards.

Chapani, an island on the southeast side of the same bank as Kepandiko, the reefs of the two islands being joined by a narrow strip of sand which dries 3 feet at low water, is about 700 yards in length in a northwest and opposite direction, low and scrub-covered; the island is uninhabited, and a British cemetery is situated on it.

The reef and bank on which Chapani is based, unlike most of those in this vicinity, in most parts slopes off very gradually and has a number of small heads which crop upon the outer edge; but the eastern edge terminates at 1,300 yards from the eastern end of the island in a sudden drop from 2 to 7 fathoms at the narrows.

Chapani is not easily distinguished when approaching from the northward in consequence of the higher land of Zanzibar appearing behind it.

Beacons and buoys.—The leading beacons for English Pass situated at Mashubi Palace and southward of Bet-el Ras have been already given with the descriptions of the coast.

Black can buoys mark the edge of the shore bank on the east side of the pass, one moored about ¾ mile northward and another 450 yards west-northwestward of Bet-el Ras.

Lightbuoy.—A red lightbuoy, exhibiting a fixed red light from a lattice-work superstructure, visible about 5 miles in clear weather, is moored on the eastern extreme of the bank extending from Chapani, on the west side of the narrows.

Directions.—To enter the English Pass eastward of Seagull Shoal, from abreast of Mungopani Lighthouse, and being 1,400 or 1,600 yards from it, steer along shore, avoiding the shallow water marked by black buoys extending nearly ½ mile off between Bububu and Bet-el Ras; the western extreme of the fall of Walleso Hill in line with the conspicuous bungalow northward of Bet-el Ras, bearing 159°, leads midway between Seagull Shoal and the shore.

When near the southern black buoy, off Bet-el Ras, bring the Marubi Palace beacons in line bearing 168° and steer for them, leaving the red lightbuoy on the starboard hand until the Bet-el Ras beacons are in line astern 42°, when keep them so, steering 222° for the anchorage.

To pass westward of the Seagull Shoal steer for Kebandiko Islet in line with the Government hospital, 174°, until the small white house in Mtoni village bears 145°, when edge in toward Bet-el Ras to get on the first leading line described and then proceed as before.

By night.—Having passed about ¾ mile westward of Mungopani Light, steer along the land toward Seagull Shoal, which may be avoided by bearings of that light, and when the white fixed lights at Marhubi are in line bearing 168° steer for them, passing eastward of the lightbuoy, then bring the leading lights southward of Bet-el Ras in line 42°, using them as a stern mark, and steer 222° to the anchorage.

Anchorages.—The anchorage off Zanzibar Town in from 7 to 12 fathoms is good everywhere, but with Ras Shangani bearing between 61° and 90° is an area in which anchorage is prohibited on account of the telegraph cables, two telegraph buoys on the edge of the bank off the point marking the inner ends of these lines.

The anchorage for vessels of war is northward of the northern limit of the prohibited area and between it and a line drawn in a direction 339° for a distance of 400 yards and from that position continued 304°.

Merchant vessels anchor to the northeastward of the northern limit of the anchorage for vessels of war, also southeastward of the southern limit of the prohibited area and as far south as a line drawn 270° from Kiungani Mission.

The anchorage for dhows is close to the western edge of Malindi Spit, north-northeastward of the Sultan's palace, and during the northeast monsoon the smell from these vessels is so offensive that other vessels anchoring in that part of the harbor should select a berth somewhat offshore.

Quarantine anchorage.—The ordinary quarantine anchorage is to the southward of a line drawn 270° from Kiungani Mission, and in the event of an outbreak of bubonic plague the isolation anchorage is at Chango Island.

The limits of these anchorages are shown by pecked lines on the plan.

Mooring buoys.—The position of mooring buoys, two belonging to the Government and others to lines of steamers calling at the port, will be seen on the plan.

Town.—The town of Zanzibar (native name Unguja), within Ras Shangani, from the westward appears somewhat imposing, owing to the large buildings near the point, but behind these is a maze of narrow and tortuous lanes running between mud huts and dilapidated coral-built houses, which really form the bulk of the town.

The largest buildings are built on the shore, facing the north, but there are also others on the southern side of Ras Shangani, and in addition to those already mentioned as forming marks is the Sultan's palace, which flies a red flag on a flagstaff westward of it and is situated about 600 yards northeastward of the ras; southward of the palace are the Government offices, fronted by the customhouse and its wharf, while on either side are the houses of the principal European merchants. In 1910 the population of the town was 35,262.

Communication.—There is direct communication with Europe by the following steamships companies:

Every three weeks by the Clan-Ellerman-Harrison joint line, via the Suez Canal.

Every four weeks by the Union Castle Steamship Co., Messageries Maritimes, Societa Nazionale di Servizi Marittimi, and British India, the latter conveying mails to Aden, and connecting with the Peninsular & Oriental Steam Navigation Co.'s steamers.

Communication with Bombay is maintained by the British India Lines every three weeks, also by steam vessels of Messrs. Bullard, King & Co., and a small steamer connects with Dar es Salaam and other Portuguese ports.

A light railway connects Zanzibar town with Bububu, and there is a motor road to Kokotoni, on the northwest coast, a distance of 23 miles, besides other roads for vehicular and motor traffic.

Submarine cables connect with the Cape of Good Hope via Mozambique, Delagoa Bay, and Natal, with Mombasa and with Bagamoyo, and with Aden, also with Seychelles and Mauritius, and by an alternative cable from the latter island with Durban, the Cape of Good Hope, and Australia. The telegraph establishment is on Ras Shangani, and there is also a station on Bawi.

Radio station.—The radio station at Mgombani, close to the southward of the Upper Kiungani Beacon, is open to the public from 8 a. m. to noon and from 2 p. m. to 4 p. m., the call letters being V. P. Z. Radio communication can be carried on with Pemba.

Coal and supplies.—About 7,000 tons of coal and 3,500 tons of patent fuel are kept in stock, about 7,500 tons of the former being imported annually; oil fuel could be imported if required. Coaling is carried on by baskets and bags, averaging about 50 to the ton, and from 250 to 500 tons of coal could be put on board in 24 hours. About 20 lighters, holding from 25 to 100 tons each, are available.

Fresh meat, bread, vegetables, fowls, eggs, goats, and mutton, some of inferior quality, may be obtained; fish abounds and fruit is plentiful in the season. Water, supplied on contract, is very good; in addition to the Government main town pipes, vessels can be supplied by the water tanks holding 43 and 40 tons, respectively, and having steam pumps, which empty them in one hour, while a 12-ton water tank is fitted with a hand pump.

Repairs.—Very small repairs might be effected by the public works department, and small craft can beach in safety.

Hospitals.—Two hospitals are maintained, one, under the control of the Government, being principally for natives, while the other, under the Universities Mission, is chiefly but not exclusively for its members.

Coast.—**Ras Oswawembe,** the northwestern extreme of Zanzibar Island, 3½ miles northward of Mungopani Lighthouse, is a low cliffy point, between which and Ras Nungwe, the north point of Zanzibar Island, is Kokotoni Harbor, sheltered by Tumbatu Island, as presently described. A small 5-fathom bank lies about 2½ miles westward of Ras Oswawembe.

Immediately eastward of Ras Oswawembe, and between it and Ras Mwanda, is a mangrove bay, at the head of which is Mwanda village, westward of which Mto Mzinga-Mzinga discharges itself from an extensive plain, mostly under water in the rainy season. From Ras Mwanda to Ras Nungwe the shore is sandy, interspersed with low cliffs.

About 3 miles to the southward of Ras Nungwe, two islets lie ½ mile from the Zanzibar coast, on the shore reef, which here dries off 1¾ miles; the northern island is named Daloni.

Hills.—Southeastward, about 4 miles from Ras Oswawembe, at the farther side of the Mzinga-Mzinga Plain, are the Dongi Hills, 330 feet high, and covered with coconut trees, and about 2½ miles to the northward of them is Kokotoni Hill, an isolated rounded eminence 260 feet high, separated from the Dongi Hills by ravines, through one of which Mto Kipanga runs. Northward of Kokotoni are several isolated hills, the most remarkable of which is Gungodi, a coralline tumulus 230 feet high, similar to and greatly resembling Hatajwa, before described, near the southern end of the island.

Water.—The Mto Kipanga, falling into the sea at Ras Mwanda, comes from perennial springs a few miles inland; the water is good and never fails, and a boat could easily send casks a few hundred yards up the bed of the stream to be filled. The mouth is concealed by mangroves and is not easily found.

Tumbatu Island, 5¾ miles in length in a north and south direction, and 1¼ miles across at its widest part, lies north-northeastward of Ras Oswawembe, its nearest point being 1¼ miles distant from the southern shore of Kokotoni Harbor; it is flat, rocky, and faced by low cliffs, except a portion of its eastern side, and is densely covered with trees from 40 to 50 feet high.

Off the southern point of the island, the reef on which it lies is awash for 1½ miles in the direction of Ras Oswawembe, and terminates in Mmawali Sand Head, which dries 11 feet at low water, springs; about 1,200 yards eastward of Mmawali Sand Head a spur of shore bank extending fully 1 mile south-southwestward of the reef has on it a reef awash.

The western side of the island is almost steep-to, the coral ledge nowhere extending offshore more than 200 yards; but off the eastern or inner side the coral dries at an average distance of 1 mile, greatly contracting the passage into Kokotoni Harbor. Puopo, a rocky wooded islet, stands on the eastern edge of Tumbatu Island Reef, where it is steep-to.

Tumbatu has the reputation of supplying the best sailors and pilots for the Zanzibar seas; there is no water on the island, the necessary supply being brought over from Kokotoni.

Mwana Mwana, a small coral island, 50 feet high, on the northern part of Tumbatu Reef, is covered with dense jungle, and has a drying reef extending northward from it for ½ mile, with shallow water for 400 to 600 yards farther; but northeastward from it shallow water extends 1½ miles.

Light.—Near the north extreme of Mwana Mwana Island stands a white pyramidal tower 65 feet high, from which is exhibited, at an elevation of 75 feet above high water, a revolving white light, visible 13 miles.

Dangers—Shearwater Patches.—Westward of Tumbatu Island is an area of shallow water, with patches of coral, covering a space of more than 8 miles in a north-northeast and opposite direction by 4 miles in width, and varying in depth from a few feet to 10 fathoms, the nearest danger being 2½ miles from Tumbatu Island. The shallow parts can generally be seen from aloft, but not always until close upon them; vessels should therefore keep within about 1½ miles of Tumbatu Island and of Ras Oswawembe, both of which are steep-to.

Langdon Rock, near the southern end of this area and 5 miles in a west-northwest direction from Ras Oswawembe, is nearly awash, and about 1,400 yards south-southwestward of Langdon Rock is a 1-fathom patch, the southernmost of the Shearwater dangers, with depths of from 22 to 27 fathoms within a short distance all around it, except in the direction of Langdon Rock.

Wright Rock, on the eastern side of the shallow ground, is a small head nearly awash, lying 5 miles southwestward of Mwana Mwana Lighthouse. About 1 mile from Wright Rock in the direction of the lighthouse is a 2½-fathom patch, with from 10 to 28 fathoms close around it. This is the nearest patch to Tumbatu. Between Langdon and Wright Rocks and 2¼ miles from the former is a 2½-fathom patch.

Clearing mark.—Kokotoni Hill in line with Ras Oswawembe, bearing 86°, leads southward of the southernmost danger of Shearwater Patches.

Nankivell Rock, with 3 fathoms, lies about 2½ miles northeastward of Mwana Mwana Lighthouse and 3¼ miles westward of Ras Nungwe and is near the fairway of vessels rounding Ras Nungwe and Mwana Mwana, so that care must be taken to avoid it. To pass northward of or outside the rock, Ras Nungwe Lighthouse should bear to the southward of 112° until the western side of Tumbatu opens westward of Mwana Mwana, 183°.

Ras Nungwe, the north extreme of Zanzibar Island, is sandy with low cliff at the back, clothed with dense jungle. The land behind the point is undulating, and the highest trees are about 200 feet above the sea. The fringing reef extends 1,600 yards northward and eastward, following the trend of the land to the southward at a decreasing distance.

Light.—On the extreme of Ras Nungwe stands a white square tower, 47 feet in height, with a red top, and from it is exhibited, at an elevation of 60 feet above high water, a fixed while light, visible 13 miles.

Leven Bank, 1½ miles in length in a north and south direction, 600 yards in width, and composed of coral with depths of from 6 to

10 fathoms, is steep-to, rising somewhat abruptly from a depth of 100 fathoms; its shoalest part lies 5°, distant 5¼ miles from Ras Nungwe Lighthouse, and in light winds it affords good temporary anchorage.

Current.—At the Leven Bank, in the southwest monsoon, the current always runs to the north-northwestward at from 1½ to 3 knots, decreasing to about half that rate in the northeast monsoon.

Kokotoni (Mkokotoni) Harbor, the area inclosed between the coast from Ras Mwanda and Ras Nungwe on the east and Tumbatu Island on the west, is a large and sheltered anchorage with entrance from the southwestward and northward, the space within being about 3½ miles in length and from 1 mile to 1½ miles in width. There are many villages on the Zanzibar side, and the country is well cultivated. Cattle, fowl, and eggs are plentiful. Most of the craft trading to Pemba start from this harbor.

Kokotoni is a district and village northward of Mwanda.

Entrances.—The southern entrance, between Ras Oswawembe and Tumbatu Island, only adapted for vessels of less than 12 feet draft, is over a bar extending between the point and Mmawali Sand, and about ½ mile in width.

Farther eastward is a reef awash at low water on a sand bank which nearly blocks the channel, leaving a narrow passage between it and Ras Mwanda; this bank can generally be seen from aloft, although the water is not clear.

The northern entrance between the reef fringing the coast southward of Ras Nungwe and that extending from Mwana Mwana is about 2 miles in width, but narrows within to about 400 yards between shore bank extending abreast Gungodi Hill and reef stretching northeastward of Puopo Island; immediately afterwards the harbor opens out to 1½ miles in width.

Depths.—The depth on the bar crossing the southern entrance is about 2½ fathoms, over mud, increasing to 3½ fathoms within it and to 5 to 6 fathoms in the narrow channel between Ras Mwanda and the reef; steam vessels not exceeding 12 feet draft can use this entrance.

In the northern entrance the depths are from 7 to 10 fathoms, shoaling to 6 fathoms in the narrow part northeastward of Puopo Island, and increasing to from 7 to 9 fathoms at the anchorage.

Buoys.—The southern entrance is marked by five buoys; the outermost, a red can buoy, surmounted by a staff and a red flag, being immediately outside the bar, and two red barrel buoys mark the south side of the fairway within it.

A black barrel buoy marks the north side of the channel over the bar, and a similar buoy the south extreme of the reef awash, northwestward of Ras Mwanda.

In the northern entrance a red can buoy marks the extreme of the reef extending northeastward of Puopo Island.

Owing to birds perching on the buoys, the tops are frequently whitened.

Directions.—To enter Kokotoni by the southern channel, if the buoys are in position, it is only necessary to pass between those marking the bar, otherwise the eye and the chart are the guides, as there are no leading marks; after passing the bar bring Kokotoni Hill to bear 106° and steer in for it, leaving the buoy marking the sand bank on Mmawali Reef on the north side; this sand bank may always be seen at a distance of 800 yards.

When Puopo Island begins to open of Tumbatu, about 22°, the center reef will be on the port beam and should be made out from aloft; in which case round it by eye, giving the visible part a good berth, as it deepens very gradually. Should the reef not be discerned when Puopo begins to open alter course to about 44° for Gungodi Hill, having Makutani Flat Islet slightly on the port bow; this course leads to the anchorage.

To enter Kokotoni Harbor from the northward, from about 1½ miles off Ras Nungwe, steer for the lighthouse on Mwana Mwana, bearing 229° until Kokotoni Hill, well open eastward of Puopo, bears 181°; this leads 1 mile eastward of the Nankivell Rock. Steer for the hill on that bearing, looking out for the reef which stretches nearly 2 miles off the coast of Zanzibar, and can generally be seen until Gungodi Hill bears 118°; then alter course to 168°, keeping a sharp lookout for the reef extending northeastward of Puopo, which is not easily seen, and leaving the red buoy marking it to the westward.

When the eastern extremes of Puopo open of each other alter course to pass about 600 yards from it, and when the center of Puopo is abeam all dangers have been passed and anchorage can be chosen as desired. There is considerable swell at times northward of Puopo, but it does not fetch home through the narrows to the harbor.

The water is thick, concealing any shoal with more than 12 feet on it, and, as the streams are strong, too much care can not be taken; there is, however, no swell and the bottom is generally soft.

Anchorages.—In the southwest monsoon there is good anchorage westward of Ras Nungwe in the northern approach to Kokotoni Harbor, in a depth of 10 fathoms, over sand, with the lighthouse point bearing 68°, distant nearly 3 miles.

A good berth for a small vessel in the harbor is in 4½ fathoms, mud, off Kokotoni village, with the south point of Tumbatu bearing 286° and the eastern extreme of Puopo 7°. For a large vessel a better berth is farther north in 8 fathoms, mud, with the south point of Tumbatu bearing 236° and the northeast side of Puopo 337°; here the tidal stream is not so strong.

Tides.—In Kokotoni Harbor it is high water, full and change, at 4 h. 10 m.; springs rise 15 feet, neaps 10 feet.

Tidal streams.—As a rule the stream of the rising tide sets to the southward and the other stream in a contrary direction, but both streams are much influenced by the wind. In the southwest monsoon, at neaps, there is a continuous north-going stream and during this season the greatest irregularity in the tides prevails. The streams are strongest off Ras Mwanda.

Zanzibar Channel—Directions.—In making Ras Nungwe, the north point of Zanzibar Island, due allowance must be made for the strong current setting in a north-northwest direction through the channel between Zanzibar and Pemba. In the southwest monsoon it runs at rates of from 2 to 4 knots; in the northeast monsoon at from 1 knot to 2½ knots in the same direction.

Ras Nungwe, on which is the lighthouse already described, makes as a low uniform woody point, and should be passed about 1½ miles distant to clear the projecting reef, which can always be seen by the breakers.

As the dangerous Shearwater Patches do not generally show well, and there are other reefs to the southward at a few miles from the coast, vessels should keep along the land about 1 mile offshore as far as Mungopani Lighthouse, when proceed through English Pass.

The foregoing directions are for a steam vessel, or for a sailing vessel with a fair wind.

In the southwest monsoon a sailing vessel should choose the early morning, when the wind will probably be westward of southwest, or the afternoon, after it has come round to the southeastward. At either time it is possible to keep along the land from Mwana Mwana Island and escape working to windward, which should be avoided in consequence of the numerous outlying reefs to the westward, to avoid which the Zanzibar shore should always be kept aboard.

At night.—The lights at Ras Nungwe, Mwana Mwana, Mungopani, and also leading lights for Zanzibar Harbor, being all good guides, there is no difficulty in the navigation at night except for strangers, and the harbor is constantly entered and quitted at that time.

Leaving Zanzibar.—Steam vessels leaving Zanzibar will, of course, take the most direct channel for their destination.

In either monsoon a sailing vessel should generally make a fair wind of it and leave Zanzibar by the lee pass. If bound southward in the southwest monsoon this may appear to put a vessel a long way to leeward, but probably nothing will be lost by it, for to work to the southward, an offing of 90 miles must be gained in order to be outside the main current, which runs strongly along the land to the northward, and that offing will be gained soonest by the north channel.

A sailing vessel must leave Zanzibar anchorage in the morning to make certain of anchoring off Ras Nungwe for the night, and should weigh from that anchorage with the first of the southwesterly or land breeze in the morning, and stand out to cross the strength of the current as soon as possible; a liberal allowance must be made for the set to the north-northwestward into Pemba Channel.

To leave with the afternoon sea breeze will result in a vessel being swept up the Pemba Channel, and even if the morning wind be light the same may occur; in such a case it is best to accept the inevitable and to run through the Pemba Channel at once, rather than try to beat out to windward of it. There is no way of avoiding this possibility, and many vessels are set far northward of Pemba before getting outside of the north-going current.

If bound northward in this season the wind is favorable; run through the Pemba Channel during daylight, if possible.

If the southern pass be attempted during the southwest monsoon, leave either early or late, and anchor off Chumbe Island, if necessary, until the wind shifts again at night.

During the northeast monsoon a sailing vessel bound northward might keep along the land northward of the town by starting about 2 p. m., but it would be necessary to anchor that night and wait until the same hour next day unless the morning should be favorable for short tacks between Shearwater Patches and Tumbara Island. On the whole a vessel would probably gain by running out to the southward around Ras Kizimkazi, thus getting quickly into the fair current outside.

Anchorage.—In a case of emergency, or if overtaken by night or thick weather, anchorage may be taken up anywhere in Zanzibar Channel, in a depth of 25 fathoms or less water, except near the entrances.

Zanzibar Island—East coast.—From Ras Kizimkazi the coats, curving around to the northeastward for about 8 miles to Ras Makunduchi, presents a uniform low cliff from 15 to 20 feet high, backed by gently rising ground about 70 feet high, until about 2 miles from the latter point, where there is a slightly receding sandy bay; the steep-to coral reef, fringing the coast, dries off from ⅓ to ¾ mile.

Kizimkazi Patch, 1¼ miles offshore, at about 4 miles northeastward of Ras Kizimkazi, is 1¼ miles in length and 1,400 yards in width, with depths of from 8 to 9 fathoms over coral and sand.

From Ras Makunduchi the coast turns to the northward for about 16 miles to Chuaka Head, and for about 12 miles to Michamvi, a low, rounded point covered with coconut palms; it is sandy, with several villages on it; from Michamvi for 4 miles to Chuaka Head it is low and generally rocky.

The fringing coral reef, steep-to and drying 2 feet in places, extends from ½ mile to nearly 2 miles off this part of the coast.

Chuaka Head, the northern extreme of a peninsula about 5 miles in length, is a bold headland about 70 feet high, faced by cliffs and surrounded by a fringing coral reef stretching 1½ miles to the northward of it and drying 2 feet; as the outer edge of this reef is not steep-to and the water is thick and discolored, the point should not be rounded too closely.

Chuaka Bay.—Westward of Chuaka Head, and between it and Ras Urua, is the entrance to Chuaka Bay, extending from the latter point about 8 miles to the southward, with low shores, generally sandy or composed of mangroves, and with several mangrove creeks at its head, while inland to the westward several low but abrupt, isolated coralline hillocks rise above the surrounding vegetation. The bay is so shallow as to be nearly useless, and midway between the entrance points is a reef drying 1 foot, on which the sea usually breaks.

Anchorage.—Temporary anchorage may be obtained in a depth of 5 fathoms, over sand, between Chuaka Head and the middle reef, and 600 yards from the fringing reef, with Chuaka Head bearing 145°.

Tidal streams.—The tidal streams set strongly and regularly in and out of the bay.

Villages.—Several villages stand on the shores of the bay, Chuaka village, in the southwest corner, being the principal one, and northward of it are three large bungalows, used as health resorts by the Sultan and also by the residents of Zanzibar.

Coast.—From Ras Urua the coast has a general north-northwest trend for 24 miles to Ras Nungwe, and northwestward of Ras Urua is a small bay, with Mdudu and Pongwi villages, where some supplies may be obtained; from this bay a slight bight is formed, 13 miles in length, the coast being mostly low and sandy and backed by rising ground a few miles inland.

This coast is fringed by a coral reef drying about 2 feet at low water and extending from ½ mile to 1¼ miles off it, the reef being so steep-to that a depth of 30 fathoms may be found at about ¾ mile outside it.

Mwemba, 15 miles northward of Ras Urua, is a small sandy islet, with tall casuarina trees, which may be seen from a distance of 10 miles, standing on the western edge of a coral reef, 4 miles in length in a north and south direction and 2 miles in width; the reef, drying 2 feet at low water, springs, has a steep-to edge. The channel between Mwemba and Zanzibar Island, 1¼ miles in width, has depths of from 45 to 55 fathoms, and the western point of the islet, which is steep-to, may be passed at a prudent distance.

Water.—The islet is resorted to by fishermen, and a small supply of water may be obtained from a masonry well in its center.

Anchorage.—In the southwest monsoon there is anchorage in about 10 fathoms, over sand, about ¾ mile northward of Mwemba Islet, under the lee of the reef.

Coast.—The coast from abreast Mwemba Islet trending north-northwestward to Ras Nungwe, consists alternately of low cliffs and sandy bays, and the fringing coral reef, drying off about 1 mile and on which the sea always breaks heavily, is steep-to.

CHAPTER X.

PEMBA ISLAND AND CHANNEL—MAINLAND COAST FROM PANGANI BAY TO FORMOSA BAY.

Pemba Island, named by the Arabs Al Huthera (the Green), and lying 23 miles northeastward of Zanzibar Island, of which it is a dependency, is 38 miles long in a north and south direction, and about 13 miles wide, including the islands off its western side, which protect the numerous harbors on that coast.

The height of Pemba Island does not exceed 300 feet, and there is no main ridge or line of hills, but all the latter are about the same height, their ridges radiating out in all directions from a central point, generally in horseshoe curves, and are covered with luxuriant vegetation. The soil is rich, the principal produce being cloves, most of the grooves of these trees being on the western part of the island.

The fringing and other reefs on the western side of Pemba Island are generally steep-to, and extend less than 1 mile from the coast or the islets, while on the eastern coast the shore reef extending about ½ mile is also steep-to, with breaks opposite the several creeks that indent the coast, affording passage for boats in fine weather.

By day Pemba makes as a low island with uniform outline, and is visible from a distance of about 15 miles, but it can not be seen from any distance by night unless by moonlight.

Harbors.—Chaki Chaki, on the west coast, is the best harbor and the easiest of access; it affords shelter from all winds for all classes of vessels, but the depths are in many parts inconvenient for anchorage. Kingoje Bay, and Ports Cockburn, George, Kishi Kashi, and Kiuyu, are also anchorages on the west coast, while on the east side of the island are Mtangani and Mchengangazi.

Caution.—A good lookout from aloft should be kept when entering any of the anchorages in Pemba, as the survey on which the plan of these harbors is based was not altogether completed; and, from the nature of the bottom, it is possible that small uncharted dangers may exist.

The best time for entering is when the sun is in a favorable position; but the water is sometimes muddy, and the shoals, under such conditions, are not always discernible even from the masthead. The bearings of mangrove points must be used with caution, as the points themselves are liable to grow outwards.

Target or torpedo practice may be carried out during the northeast monsoon, at the entrance to Chaki Chaki Bay, in the space southward of Mesale Island; or, during the southwest monsoon, near Ras Kiuyu, at the north end of the island.

Ras Upembe (Nassoon Point) is a bold, cliffy point, 72 feet high, steep-to, and clear of bushes for a short distance from its outer edge, and having a small sandy beach on its western side is very conspicuous from the southwestward; the sea sometimes breaks heavily against the point.

Tides.—It is high water, full and change, at Ras Upembe, at 4 h. 2 m.; springs rise 13½ feet, neaps rise 8½ feet.

Upembe Passage.—The southwestern side of Pemba Island, westward of Ras Upembe, is fronted by a detached sunken reef, about 11 miles in length, on which are several islands and rocks above water, and between this reef and the coast is Upembe Passage, much used by dhows. A description is here appended, but the plan will afford more information than a written description of these passages.

The western and principal of the two southern entrances to Upembe Passage lies close westward of Ras Upembe, and about 2 miles northeastward of Ras Upembe is the eastern entrance to the passage, which is marked by a small coral islet about 20 feet high, lying on the coast reef; between this islet and Ras Upembe are two white sandy beaches. About 1 mile northeastward of the eastern entrance is a conspicuous clump of trees, 80 feet high.

Observation Point and South Ras Domoni, within the entrance of the western passage, northwestward of Ras Upembe, are cliffy overhanging coral projections, with bushes close up to the edge of the cliff, and between these two points the channel is nearly dry at low water, springs.

Supplies.—Fufuni or Kangani village lies near the coast about 2 miles northwestward of South Ras Domoni; fowls, eggs, etc., are obtainable here, but the water is bad.

Hinsuani Islet, 54 feet in height, and the Twins 31 and 28 feet high, are wooded islets, with cliffy coral overhanging shores, standing on the reef about 1 mile westward of Ras Upembe; the reef dries around them at low water. Miugani Islet, 2 miles westward of Hinsuani, is 50 feet high and thickly wooded; the surf breaks against it at high water, but at low water the reef dries for some distance around it.

Yombi, Pansa, and Matumbene Islands, with three others between the two last named, are practically one island, being only separated from each other by mangrove creeks navigable by boats at high water; the islands are all thickly wooded, and about 100 feet high, and on the southwestern side of Matumbene is a long white sand beach, backed by a grove of casuarinas. There are several other islets and rocks on the reef off Matumbene, but they are not easily distinguished unless close-to.

Ras Miugani (Said Point), the southern point of Pansa Island, is a bold, cliffy coral point, 40 feet high, with a conspicuous white sandy beach on its western side; the coral ledge on which it stands dries off about 200 yards.

Panani Islet, 55 feet high, about 2½ miles west-northwestward of Ras Miugani, has a cliffy coral shore, and is covered with bushes and trees; it shows white, and is conspicuous from the southeastward, when open clear of the land.

Sumwago Islet, a bare coral islet or rock with overhanging cliffs, 20 feet high, westward of Matumbene, stands well out on the reef and shows clear of the main island when seen from the southward.

Matumbe Makupa (Soleman Island), 400 yards northwestward of Matumbene Island, with drying reef between, is 149 feet high, thickly wooded, and has a cliffy coral shore on its western side. Barue Rock, 35 feet high, covered with bushes, and with coral cliffy shores, lies 200 yards westward of the western extreme of Matumbe Makupa, and shows well clear of the main island from both the southward and northward.

Middle Islet, 16 feet high and very small, shows conspicuously between Kwata or Brisk Island, 25 feet high, and Matumbe Makupa.

Makungwi Island, the northeasternmost of the group, is 1¾ miles long in a west-northwest and opposite direction, and between it and the coast of Pemba is the northern entrance to the Upembe Passage. The island is partly cultivated, has several low hills, and the tops of the coconut trees are about 100 feet above high water.

Anchorage.—Pochin Beach is near the north extreme of Makungwi, and about 1¼ miles northward of its anchorage in about 10 fathoms, for small vessels, with the west extreme of the island bearing about 203°, and the east extreme 150°, approaching it carefully on the latter bearing.

Fringing Reefs.—The fringing reef, curving gradually round outside the above-mentioned islands, always breaks, and is steep-to, its outer edge drying at low water; northward of Kwata and Makungwi Islands, where it extends from 1 to 1½ miles, it is broken in places and irregular. Northward of Makungwi to North Ras Domoni, the southern point of Kingoje Bay, the coast is fronted by reef, dry at low water, extending to nearly 1½ miles in places, and with not more than 3 fathoms at 2 miles offshore.

Upembe Passage.—Between the islands described and Pemba, the space is encumbered by reefs, with narrow passages much used by dhows, the principal of these, leading to the southward, being Upembe Passage, which has its northern entrance between the reefs extending northward from Makungwi Island and those either fringing or detached from the Pemba shore; from thence it lies along the coast of Pemba to Ras Upembe. Its southern entrance has been already described; its total length is about 13 miles.

Kohani (Mkoani), a small port, the channel to which branches off southeastward, within the northern entrance to Upembe Passage, is about 1½ miles northeastward of Makungwi Island.

Buoys.—Mkoani Channel, leading to the port, is marked on the starboard hand by red buoys and on the port hand by black buoys, the outer of the former being a can buoy surmounted by a staff and flag, while the remainder are small barrel buoys; owing to birds perching on the buoys their tops are often whitened.

Rock.—A rock awash at low water is situated 400 yards southeastward of the outer black buoy. The shoal water on the northeast side of the port is reported to be extending.

Current.—The current divides southward of Ras Upembe and follows the line of coast northeastward and northwestward at from 1 knot during the northeast monsoon to 3 knots during the southwest monsoon. There are heavy tide rips at the dividing of the current, especially when met by the outgoing stream from Upembe Passage. Off Matumbe Makupa and for about 2 miles farther northward there are tide rips and occasionally overfalls.

Kingoje Bay, between North Ras Domoni and Ras Kingoje, the southern point of entrance to Chaki Chaki Bay, is 2 miles wide, but the navigable channel is only ½ mile wide between the reefs extending about 2 miles northwestward from North Ras Domoni and the south extreme of Mwamba Kisima. A great portion of the latter dries at low water, springs, for 1½ miles westward of Ras Kingoje, and there is not more than 3 fathoms at 2 miles from the point.

Anchorage.—Within North Ras Domoni the bay is reduced by shoals to a width of about 400 yards in an east and west direction, over a space of about ½ mile, and in this space secure anchorage is afforded for moderate draft vessels, in depths of from 6 to 7 fathoms, over mud, while large vessels may anchor farther out, in from 11 to 12 fathoms, southwestward of Ras Kingoje.

Vessels should be navigated from aloft, as no definite marks are available, and the best time for entering is in the afternoon, with the sun astern.

Chaki Chaki Bay, entered between Ras Kingoje and the reef extending from it, on the southeast, and Mesale Island with its reef on the northwest, extends about 5 miles east-northeastward with a general width of about 2½ miles, gradually contracting to its eastern end, where it terminates in a mangrove creek on which stands the town of Chaki Chaki. The shores of the bay are cultivated with coconut palms, cloves, and cereals.

Although it is encumbered by numerous shoals there are large clear spaces affording good anchorages, with convenient depths for all classes of vessels.

South shore.—Ras Kingoje, a low point rising to 181 feet within, is not easily distinguished from the westward, and from it Mwamba Kisima, a reef drying from 3 to 8 feet, extends 1½ miles westward, being farther continued, by shoal water with depths under 3 fathoms, for about 1,200 yards.

Ras Tundauwa, 3 miles northeastward of Ras Kingoje, with a bay receding about 1½ miles between, is a low point, fringed by mangroves, and having a conspicuous white house and a flagstaff on its eastern side; detached reefs and shoals, separated by deep channels, extend about 2¾ miles westward of the point, and reefs and shoal water also stretch northward from it for 1¼ miles.

Ras Banani, 2½ miles eastward of Ras Tundauwa, with a bay receding nearly 1 mile between, is low and tolerably clear of bush; near its extreme is a white chimney, only visible from near the anchorage, and another is situated about 600 yards south-southwestward of the point.

North side.—Mesale Island, on the northwest side of the entrance, is about 1 mile in length in a northeast and opposite direction, low, and covered with dense forest, the trees being about 70 feet high; it stands on a coral reef, drying about 1,200 yards southwestward and southeastward from it, with shallow water ½ mile farther on the latter side. On the northern side, where the reef extends about 200 yards, it is steep-to. The island shows out well from the land in the background when seen from any direction.

Mkumbuu Peninsula, forming the north side of Chaki Chaki Bay, and dividing it from Port Cockburn, is a narrow neck of land of a uniform height of about 50 feet, and having several coconut and palmyra palms on it; its western extreme is formed of high mangrove bushes, and on its southern side is Dongo Kundu, a wedge-shaped and conspicuous projection of bright red sandstone, with another patch of red cliff ½ mile northwestward of it, which is conspicuous in some lights.

Reef extends about 1 mile to the southward, ¾ mile westward, and continued, by shoal water under 3 fathoms, about 1¾ miles southwestward from the extreme of Mkumbuu Peninsula into the entrance to Owen Channel, which separates it from Mesale Island. The remainder of the reefs and shoals in the bay are best seen from the chart.

Depths.—There are depths of from 11 to 18 fathoms in midchannel of the entrance to Chaki Chaki Bay, and excepting a bank with from 4 to 9 fathoms, at the extreme of the chain of shoals extending westward of Ras Tundauwa, these depths may be continued to southeastward of Dongo Kundu, the anchorage in that locality being in 10 fathoms.

Beacons and buoys.—On the south side a red and white vertically striped can buoy is moored about 1¼ miles to the northward of Ras Tundauwa, on the northern edge of the shoal water extending from that point.

The east and west ends of a reef off Ras Banani, on the south side of the channel leading to the town, are each marked by a beacon.

The southwest edge of Mwamba Mkumbuu, the shoal water extending from Mkumbuu Peninsula, is marked by a red can buoy.

A black conical buoy marks the extreme of reef and shoal water extending 1,200 yards southwestward of Kitambuu Islet, on the north side of the channel to the town.

Directions.—Entering Chaki Chaki Bay, Ras Banani should be brought in line with Ras Tundauwa bearing 75°, steering on this mark until the west extreme of Mkumbuu Peninsula bears 16°, when alter course for it, continuing until the southwest point of Mesale Island bears 265°, when steer 78° with Mifuni Hill, somewhat remarkable from its flat top covered with coconut palms, directly ahead.

With Dongo Kundu bearing 0°, or Ras Kingoje 200°, alter course to 58°, passing northward of the red and white vertically striped buoy, marking the extreme of the shoal water northward of Ras Tundauwa, until Dongo Kundu bears 331°, when steer 88° for the anchorage in 10 fathoms, or a vessel might proceed farther eastward, but a 3-fathom patch on the northeast side of the bay must be avoided.

If proceeding to the anchorage northwestward of Ras Tundauwa and having the southwest point of Mesale Island bearing 265° steer 89° with a large but by no means conspicuous castellated stone house, the northernmost in Chaki Chaki town, in line with a mangrove islet in the center of the channel, eastward of Ras Banani, which leads to the anchorage, or a vessel could go a little farther to the east-southeastward if the dangers can be seen.

If intending to anchor in Ngelema Bay, between Ras Kingoje and Ras Tundauwa, having entered as previously directed and steering 16° for the west extreme of Mkumbuu Peninsula, when a conical hill, 255 feet high, situated southeastward of Ras Tundauwa, bears 99° steer for it until Ras Kingoje bears 193°, when alter course to 125° for the western of two hills, 100 feet high, which should lead between the dangers on either side to the anchorage.

At low water, spring tides, the creek at the head of the bay dries completely across, so that a boat can not reach the town, but at half tide there is sufficient water for a steamboat.

Anchorages.—Temporary anchorage during the northeast monsoon, or in calm weather, in from 6 to 7 fathoms may be taken up on the bank about 1¼ miles to the southward of the southwest point of Mesale Island.

The anchorage in Ngelema Bay is in about 8 fathoms, and that northwestward of Ras Tundauwa in from 8 to 10 fathoms, with that point bearing 137°.

The anchorage to the southward of Mkumbuu Peninsula is in 10 fathoms, with Ras Tundauwa bearing 197°, distant 1⅓ miles.

Tides.—It is high water, full and change, at Mesale Island, at 4 h. 0 m.; springs rise 12 feet, neaps rise 8 feet.

Town.—Chaki Chaki has a collectorate, Government offices, a jail, and an old Portuguese fort, with a row of Government quarters for officials, all being close to the creek, while on a narrow ridge the native town stretches inland and contains a few Arab stone houses, two mosques, and narrow streets with flimsy huts.

Communication.—Chaki Chaki is connected by telephone with Kegomacha Lighthouse.

Wireless telegraph station.—Northward of the town and separated from it by a deep ravine is the wireless station with four large high masts. It is open to the public from 8 a. m. to noon and from 2 p. m. to 4 p. m., the call letters being V. Q. E.

Supplies of beef, camel, and goat flesh can be obtained, while there is an abundance of fowls and ducks, and two bakeries owned by Goanese bake European bread, Indians in the bazaar have a supply of other stores, and a good supply of water may be procured from a spring. Small supplies, such as fruit, vegetables, etc., can also be obtained at the anchorage northwestward of Ras Tundauwa.

Hospital.—There is a hospital with a European doctor and a nurse.

Owen Channel, leading to the northward, between Mkumbuu Peninsula and Mwamba Mkumbuu on the east, and Mesale Island, Uta Wa Limani, and the reef to the northward of it on the west, is deep and 1,600 yards wide between the 3-fathom lines at its entrance, but contracts in its northern part to 700 yards between the same.

Depth.—The least depth in Owen Channel is 7 fathoms in its narrowest part.

East side.—Mwamba Mkumbuu, on the eastern side, has been already mentioned as extending 1¾ miles southwestward of Mkumbuu Peninsula. On its outer part, with depths under 2 fathoms, are some isolated patches drying at low water, springs, the water shoaling very gradually toward it from the southward, from which direction it is difficult to distinguish. It is also reported to be extending to the westward, northward of the buoy marking its southwest edge.

West side.—Uta Wa Limani, a long reef extending from about ½ mile northward of Mesale Island to Vikunguni Islands, a distance of 4 miles in a northerly direction, is tolerably steep-to on its western edge, but on its eastern side shoal water extends ¾ mile toward Owen Channel. The reef dries in places, principally at the southern part.

Mesale Gap, separating Mesale Island and reef from Uta Wa Limani, is deep in mid-channel, but the sides are not steep-to. As the channel is not straight and is devoid of leading marks, it should not be used except at low water and with the sun in a favorable position.

Vikunguni and Kashani, long, narrow, and rocky islands, stand on the outer edge of the sea reef, which is a continuation northward of Uta Wa Limani, 4½ miles northward of Mesale Island; three islets, very small, but 15 feet high and conspicuous, are situated off the southern extreme of Vikunguni.

Mapanya Island, also rocky, with one or two baobab trees 30 feet high showing conspicuously above all other trees, stands on the eastern horn of the same reef as the Vikunguni Islands, which reef extends and dries for 1,400 or 1,600 yards in a south-southeast direction from the island, and has only from 6 to 18 feet for 600 yards farther; a 1¼-fathom patch lies nearly ½ mile southward of the south extreme of the reef, and a patch of 4 feet is situated about the same distance southeastward of Mapanya Island.

Buoys.—In addition to the red can buoy marking the southwest extreme of Mwamba Mkumbuu, a black conical buoy is moored in a depth of 9 fathoms at the extremity of the shoal extending 1 mile south-southeastward of Mapanya.

Port Cockburn, a capacious harbor with depths sufficient for all classes of vessels, although considerably encumbered with reefs and having in many parts inconveniently deep water, affords good anchorage in some of the long bays and creeks which indent its shores, and may be entered by either Owen Channel or Kokota Gap, the former being preferable; the dangers in the port are not buoyed.

South shore.—Mkumbuu Peninsula, forming the south shore of the port, has been mentioned.

North side.—**Kokota Island,** separated from Kashani and Mapanya Islands by Kokota Gap, and from Uvinje Island and its reef to the northward by Uvinje Gap, is about 50 feet high, has a rocky sea face, and is covered with moderately high vegetation, but has very few palm trees on it. Reef and shoal water extend about 1,200 yards westward and from 200 yards to 600 yards eastward of the island.

Kokota Gap, between the reef on which Kashani and Mapanya Islands stand and Kokota Island, is about 400 yards in width between the reefs on either side, which are steep-to and well defined, drying at low water.

Shoal.—A coral shoal, with a depth of 1¾ fathoms, lies off the southeast entrance to Kokota Gap, and ½ mile eastward of Mapanya Island.

Funzi Island, 1,600 yards eastward of Kokota, has a central plateau 40 feet high, covered with lofty palmyra palms and coconut trees to about 100 feet in height; reef and shoal water extend about ½ mile westward and 1,400 yards south-southwestward of the island. A well is situated on the northern, and a cemetery on the eastern, side of this island.

Pembe Island, lying eastward of Funzi, is somewhat like it in appearance but smaller and has more mangrove trees around it; the reef between it and the mainland of Pemba dries 6 feet at low water and extends 800 yards southward of Pembe Island. Some red cliffs at the southwestern extreme of Pembe Island are conspicuous.

Dangers.—The dangers in the port are so numerous that no written description of them would be of any service; the chart is the only guide.

Directions—Owen Channel.—No good leading marks can be given for Owen Channel, but at low water, with care, there should be no difficulty in navigating it, and the following directions may be of assistance:

From southeastward of Mesale Island bring the northwest extreme of Uvinje Island in line with the east extreme of Kashani Island, bearing 3°, and steer on this mark, which leads in mid-channel, passing about ¼ mile westward of the red can buoy, marking the southwest side of Mwamba Mkumbuu.

When the north extreme of Mkumbuu Peninsula bears 76°, alter course to 60°, which, allowing for the tidal stream, should pass midway between the sand bank drying 8 feet, on the north edge of Mwamba Mkumbuu, and the 1¼-fathom coral patch on the north side of the channel; and also in mid-channel between the 2½-fathom patch northward of Mkumbuu Peninsula and the black conical buoy 1 mile southeastward of Mapanya Island, after which steer as requisite for the anchorage selected.

Kokota Gap.—The gap should be navigated at low water, and when entering, pass about 200 yards from the east end of Kashani Island, and the same distance from Mapanya Island, from which steer to pass between the coral patches eastward and southeastward of Mapanya Island, the eastern end of Kashani Island well open of Kokota, bearing 310°, and used as a stern mark, steering 130°, leads between these banks, as also does the western end of Kashani in line with the north end of Mapanya, bearing 292°. After passing between the patches steer for the required anchorage.

The passage between Kokota and Funzi is used by small steam vessels, but that between Funzi and Pembe is only available for boats.

Tides.—It is high water, full and change, in Port Cockburn at 4 h. 0 m.; springs rise 12 feet; neaps rise 8 feet.

Supplies.—A large village is situated on Ras Kinazini, and at it fresh provisions may be obtained.

Port George, a large harbor somewhat similar to Port Cockburn, is formed on the east by the main island and on the west by Uvinje and the southern portion of Fundu. The northern part, known as Weti Harbor, into which the creek of the same name discharges, is shallow as far west as Ras Tungwi; the shores of the port are densely populated and well cultivated. The principal entrance is Uvinje Gap.

The depths in the southern part of the fairway of the port are from 10 to 20 fathoms, decreasing to from 9 to 11 fathoms at the anchorage.

East shore.—Ras Unga Wa Ngoma is a point of Pemba Island abreast Pembe Island, and from it the east shore of the port has a general northerly trend for 4 miles to Ras Tungwi, and is broken up into mangrove creeks, fronted by reef extending nearly 1 mile in places. About ¾ mile southward of Ras Tungwi is a watering place with a conspicuous house, useful as a mark.

Pasi Islet, 20 feet high, and covered with scrub, is on the western edge of a reef in the center of the southern part of Port George, on the eastern side of the fairway of the port.

Reefs border the entrance channel eastward of a line joining Pasi and Kokota, and there is a 4-fathom patch on the same side of the channel 700 yards north-northwestward of Pasi Islet. See the chart for other hangers.

West side.—Uvinje, a rocky island on the outer reef, separated from Kokota Island by Uvinje Gap, is covered with scrub and has several clumps of tall casuarina trees, reaching a height of 90 feet; on its western side are several sandy coves where boats may land at high water.

Two small grass-covered rocks, each 10 feet high, are situated near the edge of the reef southeastward of Uvinje Island, the southern rock, which is double, being about 30 yards, and the other rock about 400 yards within the edge of the reef.

Uvinje Gap, between the fringing reef of Kokota and that extending southward of Uvinje Island, is about 350 yards in width. The depths in the gap are from 14 to 40 fathoms.

Fundu Island, the largest of the outlying islands forming the western side of Port George, is 5¼ miles long, ½ mile wide, and flat, without any conspicuous feature; it is partly cultivated, and has large groves of palmyra palms. On the western side of the island are several small sandy bays.

Haramu Passage, between Uvinje and Fundu Islands, affords a boat passage at half tide, but is dry at low water, springs.

Dangers.—A small patch of coral, with a least depth of ½ fathom, lies about 400 yards northeastward of the north end of Kokota, and on the eastern side of the northeast entrance to Uvinje Gap.

Two shoal patches, about 400 yards apart in a northeast and opposite direction, are situated on the southeast side of the entrance to Weti Harbor, the southwest patch, with 3 fathoms, being 1½ miles westward of Ras Tungwi; the other patch has a least depth of 2 fathoms.

Reef and shoal water extends about 1,800 yards westward of Ras Tungwi.

Beacon and buoys.—The coral patch northeastward of Kokota is marked on its southwest side by a red and white checkered can buoy.

The southwest patch at the entrance to Weti Harbor is marked at its northwest end by a red barrel and at its southeast end by a red can buoy.

The northeastern patch is marked on its northwest side by a red can buoy surmounted by a flag.

A red can buoy is moored at the west extreme of the shoal water extending westward of Ras Tungwi.

A red beacon, surmounted by a red ball, marks the northwest side of a small drying patch of reef in the shallow part of Weti Harbor, at the entrance to Weti Creek.

Directions.—Uvinje Gap is a perfectly clear channel, safe to navigate when the sun is in a favorable position, and a vessel when entering should keep along the edge of the Uvinje Reef until abreast of Pasi Islet, passing northwestward of the red and white checkered buoy.

Good objects for fixing the position of a vessel, when approaching or leaving Weti Harbor, are Pasi Island, the house at the watering place at Mtambwi, and the rock 20 feet high off the eastern side of Fundu; the rock, 20 feet high, in the Haramu Passage, off the southern point of Fundu, might be useful.

From abreast of Pasi Island, gradually bring the two 10-foot high rocks on Uvinje Reef in line, astern, bearing 210°, after passing the 4-fathom patch 700 yards north-northwestward of Pasi; this, used as a stern mark, steering 30°, leads up to the entrance of Weti Harbor, when the buoys marking the dangers on the southeast side being left on the starboard hand, the anchorage may be steered for, but the entrance is only about ¼ mile wide between the shoals on either side.

If proceeding to the anchorage northward of Funzi and having entered Uvinje Gap by the preceding directions, when abreast the northern of the two 10-foot rocks on Uvinje Reef, bring a tall casuarina tree, situated about 800 yards northward of the south end of Uvinje, in line with that rock, bearing 278°, and using it as a stern mark, steering 98°, leads to the anchorage.

Anchorages.—The southernmost anchorage in Port George is that northeastward of Funzi, in a depth of about 14 fathoms, with the tall casuarina tree on Uvinje in line with the northern 10-foot rock on Uvinje Reef, bearing 278°, and the western extreme of Pembe Island 151° or closer to that island on the same bearing with the rock, 800 yards eastward of the north point of Kokota, just open northward of that point, 262°.

Good anchorage may also be obtained in a depth of 8 fathoms, to the westward of Mkia wa Paca, with Pasi Island bearing 213° and Ras Gogoni 109°, distant 1 mile.

Farther up the port anchorage may be taken up in about 10 fathoms at the entrance to Weti Harbor, with the two 10-foot rocks on Uvinje Reef in line, bearing 210°, and Ras Ukunjwi 351°.

Weti Harbor is secure and offers a choice of depths from 10 fathoms in the outer part to 4 fathoms abreast of Ras Tungwi.

Settlement.—The settlement at Weti Creek, where there is a conspicuous house on a bluff southwestward of it, has a customhouse situated at Chozini, on the north side of the creek, and is the residence of an assistant collector. At the watering place at Mtambwi is a small boat slip.

Piers.—Two piers extend from the shore westward of Weti settlement; the southern, about 250 yards in length, apparently dries for its whole length at low water, and is completely covered at high water, springs, its outer end being marked by a post. The northern pier, about 100 yards in length, is dry at its outer end except at high water.

Supplies of provisions and fresh water may be procured.

Inner passage.—The passage from Port George northward to Port Kishi Kashi, is shallow, and is not recommended, although available for vessels of 10 feet draft.

Port Kishi Kashi, entered through Fundu Gap, extends about 2 miles southeastward, but is small, intricate, and grealty obstructed by reefs; the outer part is deep and straight, but it is only about 100 yards wide in one place, and the sides are not quite steep-to. As there are no natural leading marks, buoys or boats should be placed on the edges of the reefs, and it is advisable to anchor in the southeast part, where the swinging room is greater and there is no current.

Depths.—Fundu Gap, which is about 100 yards in width, has depths of from 12 to 20 fathoms, and the least depth in the channel to the head is 4 fathoms, the anchorage being in from 6 to 10 fathoms.

Village.—The village of Kishi Kashi at the head is the residence of the chief of the Pemba Arabs, who owns all the northern part of Pemba Island.

Njao Island, about 2¾ miles in length in a north-northeast and opposite direction, is similar to Fundu Island, and covered with bushes and trees; it occupies the space between Fundu and Njao Gaps.

A rock, 30 feet high, stands on the fringing reef about midway of the west side of the island, the reef extending from 400 to 600 yards.

Port Kiuyu, entered northward of Njao Island through Njao Gap, is a more convenient harbor than Port Kishi Kashi, the entrance being wider and the clear space inside larger; it is indented by several shallow creeks, which are not so thickly populated as the harbors to the southward.

The depths in Njao Gap are from 13 to 36 fathoms, and within from 11 to 13 fathoms at the anchorage.

Directions.—Except that shoal water extends fully 200 yards from the reef on the south side of the entrance to the gap, the sides of the latter are well defined, the reef being steeper on the northern side, so that there is no difficulty in entering at low water, navigating from aloft, as the shoals are then plainly discernible. The last of the outgoing stream sets toward the southern side of the entrance.

Anchorage.—A good berth is in a depth of 12 fathoms, with the western point of the main island, eastward of Njao Island, bearing 210°, and the northeast point of Njao Island 310°.

Coast.—From the north side of Njao Gap the coast trends somewhat eastward of north in nearly a straight line for 5¼ miles to Ras Kegomacha, its appearance being that of a low tree-covered country, with a very uniform outline and occasional small sandy bays. Tundu Rock, 20 feet high, stands on the edge of the fringing reef, about 1 mile northward of Njao Gap.

Ras Kegomacha, the north extreme of Pemba Island, is the only point that can be recognized in this locality; it is rocky and, in addition to the lighthouse, has a clump of trees about 60 feet high on it. Pemba Island may be safely approached from the northward by night at a moderate speed and keeping the lead going.

Light.—A gray iron framework tower, 90 feet in height, stands on Ras Kegomacha, and exhibits, at an elevation of 125 feet above high water, an alternating flashing white and red light, visible 17 miles. For bearings of arc of visibility see Light List.

Msuka Bay, the indentation between the reefs immediately eastward of Ras Kegomacha, and protected by them nearly on all sides, is a good anchorage even during the northeast monsoon, when a swell comes in. The fringing reef dries for 2 miles northeastward of Ras Kegomacha, and being continued northward by shoal and discolored water appears more extensive than it really is. A sand bank on this reef about 1,200 yards northward of the point dries 10 feet at low water, springs.

Directions.—Except at low water when the reefs and shoals can be seen, the entrance to Msuka Bay is somewhat difficult, and to pass to the northward of Ras Kegomacha fringing reef Ras Kiuyu, the north extreme of the east side of the island, should not bear to the eastward of 111°, after which the eye and plan must be the best guides.

Tides.—It is high water, full and change, in Msuka Bay at 4 h. 0 m.; springs rise 13 feet; neaps rise 8 feet.

Sisini Creek, about 4½ miles southeastward of Msuka Bay, is a long but shallow inlet, with several islands and villages, and affords good shelter for small craft. Sisini village is at the head of the inlet.

Supplies.—Fruit, poultry, eggs, and yams are obtainable at Paji, within the entrance to the creek on the west side, off which there is good boat anchorage.

Ras Kiuyu, the north extreme of the east side of Pemba Island, is a rocky promontory covered with bush and faced by cliffs about 20 feet high. The northern side of the point is steep-to, and the anchorage northwestward of it is unprotected.

Pemba Knolls.—The space between Ras Kegomacha and Ras Kiuyu is occupied by numerous off-lying reefs, known as the Pemba Knolls, the easternmost of these, drying only at low water, springs, always break heavily.

Kundeni Knoll the northwesternmost of the group, drying 3 feet at low water, lies 4½ miles northeastward of Ras Kegomacha, and a small 3-fathom patch lies 1 mile nearer, nearly on the same line of bearing. A bank with 4 fathoms is 2 miles northward from Kundeni Knoll.

Funguni Knoll, about 1 mile south-southeastward of Kundeni Knoll, has on it a large sand bank which dries 8 feet at low water, springs; Punga Punge lies 2 miles northeastward of it. Nyama, Gungoyu, and several other patches, dry at low water, springs, lie between them and Ras Kiuyu.

The bank of soundings extends about 11 miles north-northeastward from Ras Kegomacha to the 100-fathom contour line, and 6½ miles northward from Ras Kiuyu to the same line, which lies about 2½ miles outside the outer drying patch of the Pemba Knolls. But little current is experienced when on the bank.

Tidal streams.—In the northern part of Pemba Channel, near the island, the stream of the rising tide getting southward, neutralizes and at times overcomes the constant north-going current, but the other tidal stream accelerates it; the streams meeting off Uvinje Island cause a confused sea, sometimes dangerous to boats.

The tidal streams run strongly in all the gaps except that of Mesale.

Currents.—In the southern part of Pemba Channel the set is always to the northward, and though affected by the tidal stream the extent of that influence has not been ascertained. In mid-channel the set of the current is about north-northwest with velocities of from 2 to 4 knots during the southwest, and from no appreciable current to 2 knots during the northeast monsoon, and at all times a vessel proceeding through the Pemba Channel will find less current near Pemba Island than in mid-channel.

Toward the northern part of the channel the current sets about in the line of the axis of the channel, and when at its strength, near the island, it frequently causes a strong ripple, having the appearance of breakers.

Northeastward and eastward of Pemba Island the current sets about north by west, or rather toward the island, rendering any estimate of position very difficult. In December, during the northeast monsoon off the eastern coast, it has been found very weak, as little as ¾ knot.

Pemba Channel—Directions.—The navigable portion of the channel is contracted by the North and South Head and Wasin Reefs, bordering the African coast, to a width of 26 miles at the southern and to 19 miles at the northern entrance, but between these dangers and the island there is deep water.

The eastern side of the channel is safer than the western side, as the reefs extend but a short distance from Pemba Island, less current is experienced, and the land is nearer as a guide to the navigator, but on the other hand Pemba Island is notorious for its large rainfall, and is frequently enveloped in rain squalls and clouds when the western side of the channel is clear.

A steam vessel proceeding northward from Zanzibar through Pemba Channel should shape course direct for Ras Kegomacha from abreast of Mwana Mwana Island; this allows for the strong northerly current and leads clear through this channel. See directions from Zanzibar.

A vessel approaching from the northward and being able to make Pemba Island by daylight is recommended to steer for Ras Kegomacha, the northwest extreme, and to keep along the Pemba shore as far as Mesale Island; then steer for Mwana Mwana Island, allowing about two points to the southward to counteract the set of the current. The three islets southward of Vikunguni Island and about 4½ miles northward of Mesale are easily identified and useful for checking the progress of the vessel, and the reef southward of them shows well with the sun to the westward.

With the aid of Ras Kegomacha light there is nothing to prevent a vessel approaching from the northward from passing through Pemba Channel by night if the weather is tolerably clear, and even should the light not be seen when expected, as before remarked, the island may be approached from that direction at a moderate speed, with the lead going, though it may be more prudent under such circumstances to keep well outside for the night and run in at daylight.

Good anchorage may be obtained on the bank extending southward of Mesale Island, at the entrance to Chaki Chaki Bay, in from 6 to 7 fathoms, if not wishing to proceed across to Zanzibar at night.

Pemba—East coast.—The eastern coast of Pemba is rather low, and should be approached with care at night, but there does not appear to be any danger beyond the fringing coast reef, which is steep-to and nowhere extends so much as 1 mile offshore. At 2 miles from the shore no soundings have anywhere been obtained with the hand lead.

From the main entrance to the Upembe Passage to Mtangani, a distance of about 7½ miles, the coast consists of overhanging coral cliffs, about 15 feet high, thickly wooded, and fronted by a reef which always breaks. Mkiwani, an entrance about 4½ miles northeastward of Ras Upembe, has a depth of 6 feet on its bar at high water, but the narrowest part of the channel, although deep, is only 14 feet wide; it is used by small dhows.

Mtangani, a clearly defined break in the reef about 150 yards wide, can be entered by small craft if navigated from aloft; the water is smooth as soon as the outer line of breakers is passed. The channel has first a northwesterly direction for nearly 1 mile, and then turns sharply to the southwestward for about 600 yards to the anchorage. A small detached patch of reef lies on the north side of the channel about 1,200 yards within the entrance.

Southwestward of the anchorage a boat passage leads to Kiwani, and from there to seaward through Mkiwani Channel, available only at high water, the entrance to the latter being 3 miles southwestward of Mtangani.

The depths are from 5 to 15 fathoms in the channel and from 7 to 10 fathoms at the anchorage.

Caution.—In entering or leaving Mtangani caution is necessary, as the current runs strongly along the edge of the reef until the outer edge is passed, when it is replaced by the tidal streams which run fairly out and in, the reverse being the case on leaving, as the current catches the vessel on the bow immediately after passing the outer edge. So clearly defined is the change from current to tidal stream that in entering the bows of the vessel may be in the tidal stream while the stern is in the current, and when leaving vice versa. There is no appreciable tidal stream at the anchorage.

Boat channel.—For about three days on either side of the highest spring tide there is a boat passage between Upembe Harbor, northward of the island, of which Ras Upembe forms the south extreme, and from thence along the shore within the reef off Mkiwani Creek.

Coast.—From Mtangani the coast, consisting of cliffy overhanging coral with numerous indentations and a few sandy beaches, trends, slightly curving, more to the northward for 17 miles, to Mchengangazi. It is lined with trees and bushes to within a few feet of the edge of the cliffs and is fringed with reef, steep-to, and generally breaking, without any off-lying dangers. The current runs northward strongly along its edge.

Mchengangazi Pass, a channel through the reef, about 200 yards wide, must be entered by conning the ship from aloft, the deep water being easily seen; about 1 mile within the entrance it expands to a large space drying at low water, with narrow creeks between, and at the head, on the north side, a narrow creek and boat passage leads to Adamson Bay.

The British naval vessel *Stork* moored in 7 fathoms, 1½ miles within the southern point of entrance, and no appreciable stream was found at this anchorage, but the tidal stream sets directly in and out of the pass, and, as at Mtangani, care must be taken on entering or leaving when passing from the current running northward along the reef into the tidal waters, and vice versa.

Tides.—It is high water, full and change, in Mchengangazi Pass at 3 h. 43 m.; springs rise 11 feet, neaps 7¾ feet, neaps range 5¾ feet.

Village.—Kodian Village is situated on the eastern side of the narrow creek leading to Adamson Bay.

Adamson Bay, 4½ miles northward of Mchengangazi, has apparently no passage from seaward into it, the reef breaking right across and the rollers setting some distance into the bay. A small coral islet lies off the southern point of the bay, and on the northern point is a conspicuous square clump of casuarina trees 100 feet high, remarkable from being the only trees of the kind in the vicinity.

Close eastward of the casuarina clump is a small black islet 54 feet high, but under the land and not easily seen.

Current.—The current sets to the northward along the coast as far as Ras Kiuyu, at from 1 knot to 3 knots, and these is sometimes a fairly strong set into Adamson Bay.

Coast.—From Adamson Bay, the coast trending eastward of north for about 8 miles, in nearly a straight line, to Ras Kiuyu, is cliffy from 15 to 20 feet high, with a few sandy beaches, and covered with scrub and trees.

Haycock Islet, 5¾ miles northward of Adamson Bay, is a small bare islet, 42 feet high, lying 400 yards from the shore, and about 200 yards within the edge of the reef; it does not show very well, being so close under the land.

Coast.—About 1 mile northward of Haycock Islet, and 200 yards within the beach, a conspicuous rounded clump of casuarina trees, 115 feet high, stands above a slightly projecting point of white sand nearly 1 mile in extent.

From Adamson Bay northward the steep-to fringing reef, extending from 400 to 1,800 yards from the shore, with no off-lying dangers, generally breaks, and from the clump of trees just now mentioned to Ras Kiuyu rocky ground extends for some distance, with coral heads, having from 2 to 3 fathoms over them, but these do not break, and it is not advisable to approach the coast within 1½ miles between the clump and Ras Kiuyu.

Mainland—Coast.—From Pangani Bay northward to Tanga Bay the coast, trending in a general north-northeast direction for 22 miles, is low, well wooded, and apparently fertile; the shore is sandy, with occasionally a small intervening cliff of coral, and there are two large bays, also several villages, the positions of which are marked by groves of tall coconut palms. Large detached reefs front the coast at a distance of about 3 miles, with passages between.

Off-lying Reefs.—South Head Reef with others close northward of Pangani Bay, have been described.

Fungu Tongone, northward of South Head Reef, and connected with it by a ridge, with about 3½ fathoms water over it in the deepest part, is about 3 miles long, and the same distance offshore; it is steep-to on its seaward side. The northern portion, which dries at low water for about 1½ miles, has a sand cay, 19 feet high, lying about the center of its western edge, and a spit extends ½ mile north-northwestward from its northern extreme, leaving a deep-water passage of about the same width between it and Karange Island Reef to the northward.

About ½ mile westward of the southern portion of Fungu Tongone is Kitanga Reef, which dries at low water, and Tengale, a similar reef, is 1½ miles southwestward of Kitanga. These, with an islet and reef off Dakali, 4½ miles from the north side of Pangani Bay, form the western side of the inner passage.

Buoy.—The northern end of Tengale is marked by a white spar buoy surmounted by two black triangles.

Karange Islands and Reef.—Karange, a low and narrow island, with a detached island at each extreme, the whole covered with scrub, occupied a space about 3½ miles long in a general north-northeast and opposite direction, lying on a coral reef, the south end of which is about 1 mile northward of Fungu Tongone, from which it extends for a distance of 6½ miles; there are deep-water passages between it and the reefs southward and northward of it.

Karange Reef is steep-to on the seaward side and generally so on the inner or western side.

Tangata Reef is the extreme of the coral reef, dry at low water, extending nearly 2 miles northeastward from a low peninsula, the center of which is occupied by a drying lagoon, covered at high water. Moarongo village is on the north side of the peninsula, and about ¾ mile within the extreme of Tangata Reef are mangrove bushes.

Mwambani Bay.—Ras Kisangani is 3¼ miles north-northeastward of the northeast point of Moarongo Peninsula, and between it and Ras Nyamaku, 3½ miles farther in the same direction is Mwambani Bay, protected by the reefs of Karange and Yambe Islands, its entrance, about ½ mile wide between the 5-fathom line on either side lying between them.

In the fairway of the inner portion of the entrance is a 2-fathom patch, with from 6 to 7 fathoms in the channel southward of it, and still deeper water on its northern side, and between the points of entrance to the bay there are from 6 to 8 fathoms, decreasing gradually to the shore reef, from 400 to 800 yards in width, fringing the bay.

Inner Passage.—A smooth water passage between the reefs described and the mainland, and leading to Mwambani Bay from the southward, is to all appearance easily navigable from aloft by the eye, toward low water, when the sun is in a favorable position, but the passage northward within Yambe Island Reef to Tanga is shallow and encumbered with rocks, and is only available for small craft at high water.

Tanga Approaches.—The coast in the vicinity of Tanga is low, but if the weather is clear, the Bondei Mountains, the eastern spurs of the Usambara Mountains, which cover a large tract of country, and are about 23 miles inland, will be conspicuous. Mbringa, the most prominent of the Bondei Mountains, is a three-peaked hill, the center and highest peak of which is about 3,600 feet above the sea, 24 miles inland, on the parallel of Yambe Island.

Rukindo, a double-peaked mountain 3,400 feet in height, 8 miles northward of Mbringa, is also prominent in certain lights, and some of the distant peaks of this range must be nearly 10,000 feet high. During the southwest monsoon these mountains are frequently obscured by haze, or perhaps only the easternmost of them will be dimly seen, but during the northeast monsoon they are generally clear.

At 17 miles northward of Tanga and about 6 miles inland are three rounded hills, of which Kilulu, the northernmost, rises 918 feet above the sea level; Kirimba is the next hill to the southward, and these are nearly always visible from seaward, while farther to the northward are two isolated conical mountains 15 miles northwestward of Wasin, Jombo, the more distant, being 1,573 feet and Mrima 1,052 feet high, and truncated, both being visible from Pemba Island.

The land elsewhere is low and flat, with the exception of the Amboni Hills, about 4 miles northwestward of Tanga, which serve well to mark its position. These hills, 495 feet high and densely wooded, are rounded and present no defined summit, but there is a well-marked saddle between the two southernmost and highest eminences, which serves as one of the leading marks for entering.

There are several low and densely wooded islands off this part of the coast which in clear weather are sometimes difficult to distinguish from the mainland, but with any haze over the land they stand out well and distinct. Karange, before mentioned, 8 miles southward of Tanga, is the southernmost of these islands, and Yambe, the next to the northward, may be known by a high group of trees toward its northern extremity, but the islands northward of Tanga are so close to the coast as to be difficult to distinguish until near the off-lying reefs; the lighthouse on Ulenge should be a guide.

The coast is thickly populated, with numerous villages, especially to the southward; these villages are often approached through mangrove-lined creeks, which are very difficult for a stranger to distinguish.

Coast.—From Ras Nyamako the coast, trending in a northerly direction for about 4 miles to Ras Kasone, is bordered with mangroves and fringed by a drying reef extending from ¼ to ¾ mile.

Islets and reefs.—The nearly continuous line of outer reefs, which run parallel with the coast line at varying distances, have navigable passages between them here and there, and the reefs, with few exceptions, break at all times and have large portions drying at low water; they are not all steep-to, and should be given a good berth.

Yambe Island.—Yambe Reef, on which is Yambe Island, is 3¾ miles long and dries from 1 foot to 6 feet at low water, and has a rocky islet 10 feet high on its southern part and a mangrove bush near its southwest edge; between it and the northern end of Karange Reef is the entrance to Mwambani Bay, before mentioned, but within Yambe Reef there is no passage for vessels. The island is about 2½ miles long, densely covered with jungle, with a clump about 70 feet high near its northern extermity; off its northern end is an islet, 15 feet high, and some rocks, the former useful for fixing a vessel's position.

Niule, a coral reef 2½ miles in length in a north-northeast and opposite direction, and ¾ mile in greatest width, is situated about 1 mile northeastward of Yambe Reef; it dries in patches at low water, and a large sand bank, the height of which varies with the monsoon, but dries 8 feet on an average, lies on its northwest side. Shallow water extends nearly 600 yards eastward, and about 400 yards northward, of the northern end of the reef into the Ship Channel.

Southern Channel.—The Southern Channel, nearly 1 mile in width, leading to Tanga Bay, between Yambe and Niule Reefs, is available for vessels of light or moderate draft.

Depths.—A narrow ridge, less than 400 yards in width, connects the east side of Yambe Reef with the south end of Niule Reef, the least depth in the fairway over it being 3 fathoms, after passing which the depths increase to 6 and 7 fathoms, with from 15 to 17 fathoms at the northern end of the channel.

Buoys.—A red and black conical buoy, surmounted by a staff and ball, is moored as a fairway buoy on the ridge in a depth of 3 fathoms, and may be passed on either side.

A black conical buoy, marked "1Y," is moored in a depth of 8 fathoms, about 600 yards north-northeastward of the 15-foot rocky islet northward of Yambe Island.

Note.—The positions of the buoys in the channels leading to Tanga Bay should not be depended on.

Fungu Nyama, a quadrangular-shaped reef 2¼ miles in length in an east and west direction, with a greatest width of 1½ miles, is situated about 1½ miles northeastward of Niule, forming the northeast side of Ship Channel. A large sand bank near its center dries about 10 feet, and banks with from 1½ to 3 fathoms lie parallel to its southeast side, distant from 800 to 1,200 yards.

Mwamba Wamba, about 2 miles north-northeastward of Fungu Nyama, is described. The passage between these reefs is barred by a ridge with several rocky patches of 4 fathoms and possibly less water, the passage being unbuoyed.

Tanga Bay, entered between Ras Kasone and Ras Chongoliani, about 1½ miles apart, extends about the same distance westward, its greater part being shallow, but there is ample space westward of Ras Kasone for vessels of moderate or light draft sheltered from all winds, and a large space within the points of entrance is available for all classes of vessels.

South shore.—Ras Kasone, the southern point of entrance, is cliffy but covered with vegetation, and about ½ mile to the southward of the point is a patch of red cliff, 40 feet high, which shows very distinctly with the sun in the east. The point is bordered by a low line of mangrove bushes, and a drying reef, extending nearly ¼ mile off it, is steep-to on the northeast but is continued by shoal water to a distance of 600 yards in a northerly direction. A flagstaff stands on the inner part of the point.

Within the point the south shore of the bay is cliffy for about 1 mile, and after that the town occupies the shore, which is steep, being the edge of a plateau 50 feet high; shore bank, under 3 fathoms, extends from 300 to 400 yards off this shore.

Tanga Island, lying about 800 yards off the southern shore, is ½ mile in length, its eastern half being composed of bare red cliffs, 30 feet high in places, but the western portion is low, with mangroves which also extend off its northern and eastern points. A quarantine station and a flagstaff are on the southeast; a coal store on the south, and a group of houses stand near the eastern ends of the island.

North shore.—Ras Chongoliani, the northern point of entrance, is bordered with mangroves, as is the shore westward of it for nearly 2 miles, to the mouth of Mto Mgambo; reef fringes the point to a distance of 400 yards, and patches of reef extend 1,600 yards southward of it, while from the north side of the mouth of Mto Mgambo a drying bank extends nearly 1 mile into the bay. The head of the bay is principally a mangrove swamp.

Ulenge Island.—Ras Kwawa is nearly 2¼ miles northeastward of Ras Chongoliani, the coast between being bordered by mangroves and fronted by drying reef, and close southeastward of the former point, and on the reef drying 3 feet, which extends 1 mile eastward and nearly 2 miles southward of it, is Ulenge Island, presenting a featureless line of mangrove bushes and rocky points.

Light.—On the east extreme of Ulenge Island is a white square tower, 85 feet in height, which exhibits, at an elevation of 85 feet above high water, a white group flashing light, with a period of 10 seconds, showing groups of two flashes; the light should be visible in clear weather from a distance of 15 miles.

Entrances.—The southern channel, forming a shorter route for vessels whose draft will permit them to use it, has been already described.

Ship Channel, the main entrance between Niule and Fungu Nyama, has a least width of 1,600 yards between the 5-fathom contour lines of the shoals on either side.

Dangers—South side.—In the Ship Channel the dangers on the southwest side are the shoal water extending 600 yards eastward and 400 yards northward of Niule.

Dixon Bank, lying on the south side of the fairway to Tanga Bay, and also fronting the northern entrance to the southern channel, is a small coral patch with a least depth of 3 fathoms, situated 98°, distant fully 2 miles from Ras Kasone.

On the south side of the bay the dangers are the reef and shoal water extending 600 yards northward of Ras Kasone, and the shore bank from 300 to 400 yards from the south shore of the bay.

North side.—On the northeast side of Ship Channel a shoal about ½ mile in length in an east-northeast and opposite direction, with a least depth of 2 fathoms, lies 1¼ miles southward of Fungu Nyama.

Ulenge Reef, a detached patch, barely awash at low water, springs, lies 1⅓ miles southward of Ulenge Island, and southward of the reef extending about 600 yards are two patches of 3 fathoms.

On the north side of Tanga Bay are the patches of reef lying southward of Ras Chongoliani, and a shoal extending nearly ¼ mile eastward of Tanga Island.

Depths.—The least depth on the leading mark through Ship Channel is 11 fathoms, and the leading mark into the bay passes over a depth of 5 fathoms; the depths at the outer anchorage are from 6 to 10 fathoms and off the town from 3¼ to 3¾ fathoms.

Buoys.—A black conical buoy marked "1 Tanga" is moored in about 9 fathoms, 400 yards from the northeast side of Niule Reef.

Dixon Bank is marked on its south side by a black and white vertically stripped buoy, surmounted by a black cylinder and having "Dixon Tg." on it.

The shoal extending northward of Ras Kasone is marked by a black conical buoy with "2 Tg." on it, and similar buoys mark the ends of two points of shore bank extending off the south shore of the bay; these buoys are marked, respectively, "Tg. 3" and "Tg. 4."

On the east side of Ship Channel a red conical buoy, surmounted by the letter A, and having "A Tanga" in white letters on it, is moored in about 6 fathoms southward of the 3-fathom shoal, 1¼ miles southward of Fungu Nyama.

A red conical buoy, with letter B as a topmark and "B Tanga" in white letters on it, marks the south extreme of the shoal patches southward of Ulenge Reef.

A red spar buoy with letter C as a topmark and "C Tanga" in white letters on it, marks the east extreme of the shoal water eastward of Tanga Island.

Directions.—If entering from the southward by the Ship Channel the 10-foot rocky islet on the reef south of Yambe Island should be kept bearing westward of 229° until Ulenge Lighthouse bears 322°, when it may be steered for, and when the north cliff of Tanga Island opens northward of Ras Kasone, 267°, alter course for it, and if the weather is clear Mbringa Mountain, the northernmost of three peaks in the front of Usambara Range, will be seen on the same line of bearing.

The above course leads nearly midway between Dixon Bank and the shoals southward of Ulenge Reef, and when a saddle hill between the southern summits of Amboni Hills comes in line with the entrance to Mto Mgambo, bearing 297°, alter course for it until the northwest cliff of Tanga Island bears 247°, when steer true.

The white column (English) standing on the cliffs eastward of the town, bearing 200°, leads between the black buoy northward of Ras Kasone and the red spar buoy eastward of Tanga Island, and anchorage may be taken up as convenient between Tanga Island and the south shore.

The water is generally clear near Niule, Fungu Nyama, and other outer reefs, but within Ulenge Reef it is discolored and the shoals not easily seen.

If entering by the Southern Channel the fairway buoy on the shoal ridge may be passed on either hand and a course steered to pass eastward of the black buoy off the north end of Yambe Island. Dixon Bank Buoy may be passed on either side, and when the north cliff of Tanga Island opens off Ras Kasone, bearing 267°, steer on these marks and follow the directions already given.

Anchorage.—There is good anchorage anywhere between Tanga Island and the south shore, but it is much cooler if anchored as far out as possible, as the plateau behind Ras Kasone shuts off the wind in either monsoon if the vessel is too close in; a good berth will be found in a depth of 7 fathoms, over mud, with the north extreme of the mangroves off Ras Kasone bearing 74° and the same extreme of the mangroves off Tanga Island 285°, although too much reliance should not be placed on bearings of mangrove points.

Shelter may be obtained in either monsoon under the lee of any of the outer reefs if it is not desired to enter Tanga Bay.

Tides.—It is high water, full and change, in Tanga Bay at 4 h. 0 m.; springs rise 12 feet; neaps rise 7 feet.

Mto Zigi, known at its mouth as Mto Mgambo, discharging into the northwest corner of the bay, where it has a depth of 3 feet at low water, is navigable for a few miles, and then becomes obstructed by rapids; above Amboni it is free from mangroves, passing between limestone hills with picturesque scenery.

Town.—Tanga, the principal town in the northern part of German East Africa and the point of departure for all caravans to the interior as far northward as Lake Victoria Nyanza, stands on a plateau about 50 feet above the sea and is partly concealed by mango trees and coconut palm groves, but several of the more prominent buildings are seen. There is a customhouse and mission station; a district official is resident and there is a small garrison. The native population is about 4,000, in addition to from 60 to 70 Europeans.

Pier.—A stone mole, with an iron pier projecting from it, forming a double pierhead, extends about 200 yards to the northward from immediately eastward of the customhouse. The western pierhead has a depth of about 10 or 11 feet at its extreme, and the eastern one dries, the railway running onto both piers.

Lights.—A fixed white light is shown, at an elevation of 13 feet above high water, from a pole at each extreme of the western pierhead. The lights are visible 3 miles.

Communication.—The Usambara Railway is open to New Moschi at the foot of Mount Kilimandjiro, a distance of 222 miles, trains running twice every week; and trains run every day to Buiko from Tanga, a distance of 110 miles, except on Sundays, when they go only as far as Korogwe, 54 miles.

Coal and supplies.—A small coal store is situated on Tanga Island, and two lighters holding from 50 to 60 tons each are available.

Tanga is said to be the best place for supplies on the east coast of Africa, the meat being very good, and fish, vegetables, and fruit are abundant. The water, from wells in the town, being probably impregnated with sewage, should be avoided.

Hospital.—A hospital is maintained in the town.

Trade.—The trade of the district is small, but most of it passes through Tanga. The exports consist of cattle, sheep, goats, coconuts, copra, corn, rice, maize, and sesame, while the imports include many necessary articles. Occasional flights of locusts are destructive to agriculture.

Kwale (Mnasini) Island, about ¾ mile northward of Ulenge Island, is about 2¼miles long on its eastern side, triangular in shape, mostly consisting of mangrove swamp, and uninhabited. Its seaward side is steep-to, except off its northern and southern extremes, where reefs extend from 400 to 600 yards, with shallow water beyond. On the other sides shallow water extends a considerable distance.

Kwale Bay, a well-sheltered anchorage, entered between the reefs fringing Ulenge and Kwale Islands, is about ½ mile wide, but is reduced to 600 yards by the shallow water extending beyond the reefs; the bay, fringed by mangroves, is shallow for about 1 mile from its head and for some distance from its north and south shores, with a boat channel northward between Kwale Island and Kwale village on the mainland, leading to Mansa Bay.

The depth in the entrance is 15 fathoms, and from 5 to 18 fathoms within.

Villages.—There are several villages in Kwale Bay, but nothing to attract a vessel under ordinary circumstances.

Mansa Bay, about 6 miles northward of Tanga Bay, inclosed between the northern side of Kwale Island and Boma Peninsula, is nearly 1 mile wide between the entrance points, Ras Mnasini on the south and Ras Mavemavili on the north, but this is reduced to 800 yards between the reefs fronting the entrance points.

The bay is 2 miles long in a north and south direction by 1½ miles wide, but shoal water, with less than 3 fathoms, extends from ½ mile to 1,600 yards off its southern and western shores, and for about 600 yards off its northeastern shore. The south and north shores are bordered by mangroves; the western shore has coconut palms in places.

Kwale Bank, consisting of several detached patches, having depths of from 4 to 4¾ fathoms over them, occupies a space about 1 mile in extent in a north and south direction, fronting the southern side of the entrance to Mansa Bay; the least water, 1½ fathoms, on a coral head on the northwest side, is situated 92°, distant $2\frac{1}{10}$ miles from Ras Mnasini.

A small bank, with 3¼ fathoms least water, lies ¾ mile southward of Kwale Bank; 600 yards farther south is a patch of 4½ fathoms.

Directions.—The best approach to Mansa Bay from the southward is by the Tanga Ship Channel until northward of the black buoy northeastward of Niule, from which position a course may be steered to pass about 1 mile eastward of Ulenge Lighthouse, keeping about that distance from the east side of Kwale Island until abreast the entrance, when a mid-channel course leads into the bay.

The channel northward of Fungu Nyama, between it and the southern end of Mwamba Wamba, is apparently available. The bar connecting these reefs has a least charted depth of 4 fathoms, the best water being toward Fungu Nyama, where the depth is from 6 to 9 fathoms, but the channel has not been closely sounded, so that less water may exist; patches of about 5 fathoms lie about 1 mile northward of Fungu Nyama.

The best approach from the northward is to enter from seaward by the wide and deep channel between Mwamba Kitugamue and Pungutiayu Island, with Kilulu Mountain in line with Ras Kungunganda, bearing 272°, from thence southwestward, keeping about 2 miles offshore and avoiding Boma Reef until abreast of the entrance.

Creeks.—Pani Mkumbi, a mangrove-lined estuary, has its entrance on the western side, and in the northern part of the bay is the Mto Mansa, a similar estuary, extending within Boma Peninsula, about 5 miles northward of Ras Mkumbi and parallel with the coast.

Villages.—Between the boat channel leading from Kwale Bay and Pani Mkumbi are Kwale, Werro, Monga, Pampani, and Kitshalikani villages, and at the head of Mto Mansa is Mansa village, with about 1,000 inhabitants, which place can be reached by dhows at high water.

Supplies.—Small supplies of cattle, sheep, and fish may be obtained from the villages in Mansa Bay, and occasionally fruit in small quantities; the water from wells or holes is bad, and the Msembasi, a stream rising in the Amboni Hills, and flowing into the bay, is the only fresh water. Mansa has some trade in millet, copra, and caoutchouc.

Coast.—Boma Reef, separated from the shore reef by a narrow 3¾-fathom channel, is dry at low water, and lies with its seaward side about 1,600 yards offshore and 3 miles northward of the entrance to Mansa Bay.

From the coast, about 1¾ miles north-northeastward of Ras Mavemavili, a narrow strip of shoal, less than 200 yards in width, and with depths of 4¾ fathoms, extends in a northeast direction toward the south extreme of Boma Reef, and from abreast that reef the coast, trending north-northeastward, curves round to the northward for 6½ miles to Ras Kilifi, with Mkandini Bay, filled with shoal water, at about 4 miles from Boma Reef.

Offlying reefs.—Mwamba Wamba, the reef next northward of Fungu Nyama, is 3½ miles in length in a north-northeast direction, by from 600 to 1,600 yards in width, and dries at low water, springs, with a sand bank toward its northern end drying about 8 feet; it is fairly steep-to all round, and lies about 5 miles off the entrance to Mansa Bay.

The passage southward of it has already been described; that on its northern side, between it and Mwamba Shundo, is about ½ mile wide, with from 6½ to 11 fathoms; it has not, however, been closely sounded.

Mwamba Shundo, 2½ miles long in a north and south direction by 1 mile wide at its northern end, where it dries about 4 feet at low water, springs, is fairly steep-to, and lies about 4½ miles offshore. Foul ground, about 1 miles in extent, with patches of from 1¼ to 2 fathoms in places, lies from ½ mile to 1½ miles northeastward of Mwamba Shundo.

Mwamba Kitugamue, about 1 mile long and dry at low water, springs, lies nearly 6 miles northeastward of Mwamba Shundo; its eastern side is steep-to, but there is a 3¾-fathom patch off its northwestern extremity. A bank, 2¼ miles long, within the 10-fathom contour line, extends south-southwestward of Kitugamue, with patches of 2¾ and 3¾ fathoms on it, and isolated patches of 7 and 10 fathoms lie north-northeastward 1 mile, and northeastward 2½ miles, respectively, from Mwamba Kitugamue.

Gomani (Moa) Bay, about 10 miles northward of Mansa Bay, has its entrance, upward of 1 mile wide, between Ras Kilifi and Ras Kungunganda; but reefs, dry at low water, extend so far from these points and from the shores of the harbor, as to leave but a very narrow channel, and that available for small craft only.

The depths for the first mile of the channel are from 8 to 10 fathoms, decreasing afterwards to 4 or 5 fathoms, near the inner buoy, and to 1¼ fathoms off the town.

Fungu Kivani, a shoal about ½ mile in length in a north and south direction, with a least depth of 1 fathom, lies between 1,400 and 1,600 yards eastward of Ras Kilifi.

Buoys.—A black conical buoy, in 3½ fathoms, marks the extreme of the shallow water on the southern side of the entrance channel, northward of Ras Kilifi.

A red can buoy with topmark A, in 4 fathoms, marks the edge of the shallow water extending southwestward of Ras Kobueni.

Directions.—Kilulu Hill in line with Ras Kungunganda, bearing 272°, leads in from seaward, passing about 1½ miles northward of Mwamba Kitugamue, in not less than 10 fathoms to the entrance of Gomani Bay; from thence, the course to the anchorage in the harbor is northward of Ras Kilifi Buoy and southward of the red buoy, where the channel turns to the northwestward to the anchorage off the town.

Anchorages.—There is anchorage in about 15 fathoms northeastward of Ras Kilifi, and between it and Fungu Kivani, and good anchorage for small craft may be obtained off the town.

Town.—The town of Moa lies on very low ground on the western shore of the bay, and is unhealthy for Europeans; it has from 500 to 600 inhabitants. Close to the shore is the customhouse, a small two-storied building, the only masonry house in the place, and conspicuous from seaward.

Supplies.—Goats, sheep, fowls, and a little fruit are obtainable; the water is bad.

Landing.—Fronting the shore, when landing, are many submerged stumps of mangrove trees to be guarded against.

Coast.—From Gomani Bay northeastward to Chale Point, a distance of about 33 miles, the land is low and well wooded, but an occasional clump of trees, as also the islands lying off the coast, stand out with some prominence from the general monotonous dead level. The shore is alternately sand beaches and low, rocky cliffs, with mangrove frontage and a fringing reef.

Between Gomani Bay and Wasin Island, a distance of about 11 miles, a bay is formed, with isolated reefs, and having in its center Sii Island, while in its northwest part the Umba and other rivers discharge; this portion is more cultivated than that farther northward toward Chale Point, but is by no means thickly populated; Vanga, Wasin, and Funzi being the only places of any size; it is drained by several small rivers navigable for 1 mile or so by the smaller class of dhows.

From Wasin Island to Chale Point there are reefs, similar to those described farther southward, lying from 1 mile to 3 miles offshore, and near the 100-fathom line; the edge of the line of reefs is shown by ripplings in calm weather, and by a confused sea during strong winds.

Landmarks.—The following mountains and hills form the background and are the first land made from seaward in clear weather: Kilulu, 918 feet high and 5 miles inland from Ras Kilifi, is a rounded hill at the northern end of a coast range of half that height; it has been mentioned as a leading mark.

Mounts Jombo, 1,573 feet, and Mrima, 1,052 feet in height, are isolated conical mountains 17 and 13 miles, respectively, northwestward of Ras Wasin, with Kiruki, a conical hill 622 feet, about 2 miles northeastward of Mrima. Mount Jombo is very sharp when bearing northward of 286°; southward of that bearing it becomes flat and not clearly defined. Mount Mrima is more truncated.

Current.—The current is very slightly felt inside the reefs and along the shore, but is sufficiently strong to accelerate the east-going stream through the Wasin Channel to velocities between 1½ and 2½ knots at springs, while the opposite stream, which is that of the rising tide, either neutralizes or slightly overcomes it.

Kirui Island.—Between Gomani Bay and the mouth of the Umba, or Mto Yimbo, lies Kirui Island, 5½ miles in length, in a north and south direction, and appearing as part of the mainland, being separated from it by a narrow and intricate canoe passage connecting the northern head of Gomani Bay with Mto Yimbo, 1 mile within the entrance. The sea coast of Kirui is low and rocky, with half a dozen sandy spots, and fringing reef extends about 1,500 yards from the shore near its center and about 2 miles southward of the mouth of the Mto Yimbo.

Mwezi, a small reef drying 2 feet at low water, springs, lies 1½ miles northeastward of Ras Kungunganda, and about 1,600 yards off the east coast of Kirui Island; it and Fungu Kivani form the southernmost dangers on the west side of the southwest approach to Wasin Channel.

Mto Yimbo, the southernmost of a series of mangrove-lined waterways, is 200 yards wide at the entrance, and barred at low water by a reef and sand bank, with depths of from 1 fathom to 2 fathoms within; Mto Yimbo is merely the channel by which the Umba River discharges. Westward of the mouth the river gradually decreases in width and depth, and leading around Kirui Island southward forms the canoe channel, already mentioned, to Gomani Bay.

Minyani Reefs, 2¼ miles southeastward of the entrance to Mto Yimbo, on the edge of the 5-fathom contour line, extending from that river, dry 3 feet at low water, springs, and always show distinctly.

Village.—Yimbo Village, standing in a grove of coconut trees on the northern bank, ⅓ mile from the mouth, is partially stockaded and consists of about 60 huts and 200 inhabitants. It is poorly supplied with water and provisions, but fish are plentiful.

Umba River, joining Mto Yimbo from the northwestward at 1 mile from the sea, is the only actual river in this neighborhood, its water being fresh at ½ mile above its junction with the Mto Yimbo. At 2 miles from the coast it runs between high banks 15 yards apart, and through a well-cultivated country, and although deep during the rainy season it is very low during the dry season, and does not appear to be navigable at any time. The river is said to be tidal as far as Jasin, about 2 miles above Yimbo, where it is 20 yards wide, but at low water, it is dry down to its mouth.

Hori Vanga, or Vanga Creek, about 1¼ miles northward of Mto Yimbo, is much smaller and similarly barred. A single palm tree stands on the southern bank, close within the entrance, near the ruins of the old town of Vanga, the present town being on the same bank and ⅓ mile farther up, and abreast it the creek is 100 yards wide at high water, at which time its windings can be followed for 3½ miles, when it becomes lost in swamps; at this distance there is a depth of 12 feet at high water, but landing is impracticable.

Boats entering the river should pass eastward of an island at its entrance.

Anchorage.—There is anchorage off Hori Vanga and Mto Yimbo entrance in a depth of 6 fathoms, over sand and shells, with the mouth of Mto Yimbo bearing 286° and the northwestern end of Sii Island 30°.

Small vessels can anchor off Mto Yimbo in about 3¾ fathoms with the northern point of entrance to the river bearing 326°, and the northwest end of Sii Island 47°, or off Hori Vanga in a similar depth, with the same end of the island 45° and the entrance to Hori Vanga 315°.

Town.—The town of Vanga, rebuilt at the end of last century, is unhealthily situated with a mangrove swamp immediately behind it; inland are several small villages of the Udigo Tribe.

Supplies.—Supplies of bullocks, goats, fowls, etc., are probably attainable, and there are several wells of water, but during the dry season it is procured about 2 miles higher up the river. Rice is largely cultivated and exported to Zanzibar.

Mto Juma, Mto Allene, and Mto Pongwe, situated in the bay northward and eastward of Hori Vanga and Sii Island, have collections of huts here and there near them, and near Mto Allene there is a considerable cultivation of corn. Mto Juma has about ½ fathom on its bar; there is a depth of 3 fathoms in the entrance to Mto

Allene and from 4 to 5 fathoms in that to Mto Pongwe; hippopotami are met with in these rivers and fish are plentiful.

Sii Island, on the northern side of the approach to Wasin from the southwestward, is uninhabited and thickly wooded with mangrove trees that rise in its center to a height of 95 feet; it is 1 mile long in a northeast and opposite direction, ½ mile wide, and stands on a drying coral reef in the middle of and connected with the northern shore of the bay. Marembo, a drying reef, lies between Sii Island and Hori Vanga.

Wasin Island, of coral, lying parallel to and about 1 mile southward of the mangrove coast, 3 miles eastward of Mto Pongwe Mouth, is 3 miles in length in an east and west direction by 1 mile in width, the trees on it rising to a height of from 70 to 90 feet.

It lies on a drying reef which only extends a short distance from its northern shore, but Mwamba Cha, on the west side, stretches 2½ miles in a west-southwest direction, and off its extreme is Mpwa, 1½ miles long east and west, its western end being nearly 4 miles from the island; on the northwest side of Mwamba Cha, shore bank of 2 fathoms and less water extends ¾ mile, and on it are Howard Rocks. Mwamba Cha continues as a drying reef, extending ¾ mile southward of the island.

Town.—Wasin Town, on the northwestern side of the island, has two mosques, about 220 huts, and 1,000 inhabitants; a reef fronting the town renders landing awkward at low water.

Supplies.—Bullocks, sheep, and fowls may be obtained, but no fruit or vegetables; fish may be caught with the seine, and gazelle are to be shot in the neighborhood. Water, from wells on the island, is brackish, and that required for drinking purposes is brought from wells on the mainland abreast the town.

Wasin Channel has a uniform breadth of about ½ mile between the island and the coast, with reef fringing the shore on either side at distances of from 200 to 400 yards. Ras Mundini, the northwest point of Wasin Island, has a square white pillar on it, while off Ras Kisimga Mkono, the northeast point of the island, is a pinnacle rock, drying 10 feet.

At ½ mile westward of Ras Wasin on the mainland, and close to the shore, is Shungilunzi Islet, 30 feet high.

Depths.—The general depths in the channel are from 5½ to 9 fathoms, but within the eastern entrance there are from 12 to 14 fathoms in the fairway; in mid-channel of the western entrance a patch of 3¾ fathoms lies about ¾ mile northwestward of Ras Mundini.

Approach to Wasin Channel—Dangers.—The dangers on the mainland side of the fairway to Wasin Channel, commencing with Fungu Kivani, have been already noticed.

Kipwa Mtu and Bunjuu, the southernmost dangers on the eastern side, lie from 2¾ to 3¾ miles eastward of Ras Kungunganda, the former being small with ¼ fathom water; Bunjuu, about 1,200 yards east-southeastward of Kipwa Mtu, dries 2 feet at low water, springs.

Mwamba Midira, nearly 2 miles northeastward of Kipwa Mtu, is an almost circular reef nearly 1½ miles in diameter, and drying 4 feet; shoal water extends round the reef for about ¼ mile from it, except on the west side, where the reef is steep-to, and on the northwest side where the shoal water stretches northward about ¾ mile; between Mwamba Midira and Mpwa are several shoal patches.

Kisiti, nearly 4 miles eastward of Mwamba Midira is a small islet near the western end of a reef about 1 mile long and having on it a few weather-beaten bushes about 12 feet high. Between it and Mwamba Midira is Mako Kokwe, drying 3 feet, and in the channels on either side of that reef are reefs and shoals, which will be seen on the chart.

Pungutiayu, a wooded island, 54 feet high, stands on a reef about 1½ miles in length in a northeast and opposite direction, which dries 6 feet. The island is situated 1¾ miles southward of the southeast point of Wasin Island and nearly midway between is Pungutiachi, a group of wooded islets, 55 feet high, and lying on a reef ¾ mile long east and west. This group, with Pungutiayu and Kisiti, are distinct features in making the land in this locality.

Lockyer Patch, with 1½ fathoms least water, lies 1¼ miles eastward of the southeast point of Wasin Island, and about 1¼ miles northeastward of Lockyer Patch are Ship Shoals, the northern head of which has a least depth of 3 fathoms. Both the two latter dangers are about 1 mile within the 100-fathom contour line, and on the south side of the eastern approach to Wasin Channel.

Stork Patch, with a least depth of 1 fathom, over three patches, is situated on a shoal extending nearly 800 yards east-northeastward of Ras Kisimga Mkono; shoal water with depths under 5 fathoms also extends nearly 600 yards northward of this point.

Mwamba Waga, on the northern side of the eastern entrance to Wasin Channel, has a depth of 3 fathoms and lies about ½ mile offshore, the coast abreast it, between Ras Rashid and Ras Wasin, having fringing reef extending for a distance of about 600 yards off it.

Strong tide rips are experienced off these islets and reefs, and with anything but calm weather there is a heavy swell.

Directions.—If proceeding to Hori Vanga or Wasin Channel from the southward, a clump of trees, 90 feet high, situated on the mainland west-northwestward of Wasin Island, and between Ras Kiremo and Ras Mgomani, bearing 35°, leads between Mwezi and

Kipwa Mui, and when the western end of Sii Island bears 2°, alter course to 325° for the anchorage off Hori Vanga.

Coming from the eastward, bring Kilulu Mount in line with Ras Kungunganda, bearing 272°, and steer on this mark until the center of Sii Island bears 348°, or if Mount Jombo can be made out, with it just open westward of that island, 344°, when alter course to 315° to pass between Bunjuu and Mwamba Midira, allowing for the current and tidal stream, and when the western end of Sii Island bears 2°, steer 340° for the anchorage, keeping a good lookout for Minyani Reefs.

If intending to enter Wasin Channel, and coming from the southward, continue with the clump of trees bearing 35°, or if from the eastward when the western end of Sii Island bears 2°, steer for it until the clump bears 35°, which should lead between Sii Island Reef and Howard Rocks, but when abreast of Sii Island the course should be somewhat more to the eastward, following the pecked line on the chart.

The 3¾-fathom patch in the middle of the entrance to Wasin Channel may be passed on either side, afterwards keeping in mid-channel until Ras Mundini, the northwest point of Wasin Island, bears 268°, when steer 88°, or if not passing through the channel anchorage may be taken up off Wasin.

If entering the eastern end of the channel from the southeastward, Mount Jombo, just open north of Ras Rashid, bearing 312°, leads northeastward of Ship Shoals, and passing through the channel the directions should be reversed. The reefs bordering the channel will usually be seen toward low water, especially if the sun is in a favorable position.

Anchorage.—The anchorage off Wasin is in a depth of 7 fathoms, avoiding the island fringing reef, with the town flagstaff bearing about 215°, the swell being felt during the southwest monsoon, if anchored farther eastward.

Tides.—It is high water, full and change, in Wasin Channel at 4 h. 1 m.; springs rise 12 feet, neaps rise 8 feet.

Funzi Bay, northward of the eastern entrance to Wasin Channel, is 2½ miles in width between Ras Rashid and Ras Kidamoni, its eastern half, known as Mto Vikuarani, being shallow and filled with shoal water, through which is a channel to Funzi village used by dhows. The western portion, between Ras Rashid and Mkame, a reef drying 3 feet, affords anchorage, but Mdua, a reef drying 2 feet, extends into it for a distance of about 1,600 yards northward of Ras Rashid.

Mto Mamoja, lined with mangrove bushes, runs into the head of the western portion of the bay.

The depths in the entrance are from 6 to 7 fathoms and from 4 to 4½ fathoms at the anchorage.

Directions.—Kiruki Hill, situated east-southeastward of Mount Jombo, open westward of some casuarina trees, on the eastern side of the entrance to Mto Mamoja, bearing 314°, leads into the bay between Mdua and Mkame Reefs, the latter usually breaking.

Anchorage.—The anchorage, which is not equal to that off Wasin, is in a depth of about 4 fathoms, with two conspicuous fir trees on Pungutiachi just open eastward of Ras Rashid, bearing about 188°.

Coast.—Ras Kanda, about ⅔ mile northeastward of Ras Kidamoni, has on it a conspicuous clump of trees, 126 feet high, which are visible from a considerable distance, and from the point, the coast trending for a distance of about 10 miles northeastward, is rocky and reef-fringed, with Sambweni, a long beach, midway, and Gaze Bay westward of Chale Point; several small villages stand amongst coconuts along this coast.

Wimbi Reefs, the first sign of the barrier reef southward of Mombasa, are four isolated patches, with depths of less than 1 fathom, and shallow ground seaward of the three northernmost; the passages between these reefs should not be taken, but within them is a good channel along the land with an entrance about 1 mile wide southward of Chale Reef, with 6 fathoms in the fairway.

Gaze Bay.—Chale Island, with its tree tops 60 feet above the sea level, is a prominent feature immediately southward of Chale Point; Chale Reef, with the island at its northern end, stretches 2¼ miles south-southwestward from Chale Point, and dries 4 feet in places, with several heads of 3 and 4 fathoms beyond it.

The depths between Wimbi Reefs and the extreme of Chale Reef are from 6 to 7 fathoms and from 4 to 4½ fathoms at the anchorage off the entrance to Gaze Bay; at the inner anchorage the depth is 3¾ fathoms, the 3-fathom contour line being 1½ miles from the head of the bay.

Shoals.—The following rocks have been discovered in the approach of Gaze Bay:

A coral head with a depth of 3 fathoms over it 2.6 miles 201° from the small islet, about 15 feet high, on the southern end of Chale Island. This coral edge is on the southern edge of a 4½-fathom shoal which extends about 900 yards northward.

A coral head with a depth of 2¾ fathoms, 2.4 miles 218° from the same islet.

A rock with a depth of 2½ fathoms over it 2.7 miles 217° from the same islet. This rock is surrounded by depths of 4 to 5 fathoms for a distance of 150 yards.

Directions.—To enter Gaze Bay, between Wimbi Reefs and Chale Reef, bring Mount Jombo well open northward of the southernmost clump of casuarina trees on the coast, bearing 280°, until the eastern extreme of Chale Island bears 30° true, when alter course to 358° for the anchorage.

Small vessels wishing to anchor within Chale Reef nearer the town of Gaze should send a boat ahead, and the following directions, said to lead to the anchorage, may be of service:

The eastern peak of Chale Plateau in line with the western extreme of some high clumps of trees southward of the town, bearing about 1°, should be steered for until a point situated 275° from the south extreme of Chale Reef is on that bearing from the vessel, when steer 15° to the anchorage.

Inshore channel.—Vessels of light draft coming from the northward desiring to avoid the current are recommended to take the passage southward of Chale Island Reef, which leads along the coast inside the Wimbi Reefs. To enter, when nearly 3 miles southward of Chale Island steer on the mark already given, or if Mount Jombo should be hidden by mist, steer for the southernmost clump of casuarina trees bearing about 280° until the clump on Ras Kanda bears 207°, when alter course for the latter until the southern end of Sambweni Beach is abeam, from which the course is 197° to clear Sambweni fringing reef.

Anchorages.—Between the southern end of Chale Reef and the mainland there is good anchorage in a depth of about 5 fathoms, over mud, with the east endof Chale Island bearing about 40° and the southernmost clump of casuarina trees on the shore 253.°

The anchorage for small vessels within the bay is in a depth of 3¾ fathoms, with Chale Point bearing 60° and a large tree on the mainland 297°, but northward of this the bay is shallow.

Town.—The town of Gaze, with about 100 native houses, built in regular rows, and one large and conspicuous white house, has a small garrison under a British officer. No supplies but fish are obtainable.

Landing is effected at low water, partly by wading, at the center of the three beaches, about 1¼ miles southward of the town, from whence there is a path to the town. At high water boats can land at the town.

If proceeding through Wasin Channel from abreast of Ras Kanda, steer to pass about 1 mile off Ras Wasin, and from thence into and through the Wasin Channel, as described.

Coast—Barrier reef.—From Chale Point the coast, generally low, trending north-northeastward nearly in a straight line for 23 miles to the entrance of Mombasa, is wooded and has overhanging cliffy coral points and sandy beaches. For about 12 miles northward of Chale Point it is fronted by a barrier reef lying from 1,000 to 1,600 yards from the shore, with a narrow passage for boats within it, and from its northern end for a distance of about 6 miles the reef joins the shore, fringing it for a width of from 400 to 1,000 yards.

Black Cliff Point, 16½ miles north-northeastward of Chale Joint, though projecting but slightly, is rendered conspicuous by its black cliffs having on them a clump of pandanus 108 feet in height.

From 1 mile beyond Black Cliff Point to Ras Muaka Singe, at the entrance to Mombasa, the reef gradually draws off the shore, being 1 mile off at the latter point, where the reef adjoining the shore is known as Andromache Reef. There is a blind boat channel inside the barrier portion of this reef from the northward to within 1 mile of Black Cliff Point.

There are apparently no dangers outside this line of reef, which is steep-to and generally marked by breakers.

Current—Caution.—The current frequently sets in toward the land to the northward of Chale Point, and off Black Cliff Point it was found on one occasion setting in a west-northwest direction at a rate of 1½ knots. The usual direction is northeastward, at from ¾ knot to 1¼ knots during the northeast monsoon and from 2½ to 3½ knots during the southwest monsoon.

In the daytime vessels proceeding southward during the southwest monsoon may avoid the strength of the current by keeping within ½ mile of the edge of the reef, but a good lookout must be kept from aloft.

Mombasa approach.—The Shimba Mountains, about 10 miles inland, extend from 7 miles northward of Chale Point for a distance of 15 miles, the highest point being 1,406 feet above the sea level, and on the southern shoulder of the range is a conspicuous tree, not visible, however, when bearing northward of 265°.

On the northern shoulder also is a single tree, a little northward of which is Mombasa Gap, between the Shimba Range and a separate flat range to the northward 990 feet high, which has a dip in its center with a cluster of trees in it; the gap does not appear open until bearing southward of 265°, when it becomes a conspicuous mark for making Mombasa.

Between the Shimba Range and the coast is a range of hills from 400 to 612 feet high, and on this range 12 miles northward of Chale Point and 368 feet above the sea is a remarkable clump of trees, while 1¾ miles farther northward is another clump somewhat similar in appearance, but not so conspicuous though somewhat higher.

At 3½ miles west-northwestward of Black Cliff Point, on the same range, is a double bushy clump of trees, 453 feet high, and ½ mile farther northward, on a separate summit 446 feet high, is a cluster of palms.

Coroa Mombasa, or the hummocks of Mombasa, forming one of the best landmarks for making Mombasa Island from the offing, are three low but remarkable hillocks about 5 miles northward of the port of Mombasa, the central hillock, about 330 feet high, being the highest; from the northeastward they appear close together.

On a nearer approach the white hospital at Mombasa, built on the high ground above Ras Mitani, has been seen at a distance of 16 miles, and with the fort and its flagstaff form capital landmarks. As the land is neared the sandy beach southward of the port indicates the position of Ras Muaka Singe, and on Ras Serani are the leading lights and beacons, an old battery and a ruined keep being close eastward of the front beacon.

Ships approaching Mombasa are warned to do so on the parallel of latitude 4° south, passing through the meridian of longitude 4° east.

Port Mombasa, including Ports Kilindini, Reitz, and Tudor, has a common entrance between Ras Muaka Singe and Mackenzie Point, within which is Mombasa Island, forming Port Mombasa on its east, Port Kilindini on its southwest, Port Reitz on its west, and Port Tudor on its north sides.

Port Mombasa (native name Mvita), entered between Ras Serani, the southeast point of Mombasa Island, and Mackenzie Point, 1,200 yards apart, extends about 1½ miles to the northward with a width of about 300 yards between the shoal water on either side; it admits and affords anchorage for all classes of vessels, but owing to the narrow space either Port Kilindini or Port Reitz are preferable for a large vessel or for a number of vessels.

West shore.—Ras Muaka Singe, the western point of the outer entrance, is cliffy, and eastward of it and the coast to the southward is Andromache Reef, which dries and extends nearly ½ mile from the point; patches of from 3¾ to 4 fathoms lie about 1¼ miles east-southeastward of the point, and a patch of 1½ fathoms at 1 mile eastward of the point is the outermost danger in that direction.

Mombasa Island (Kisiwa Mvita), the eastern side of which forms the west short of Port Mombasa, is 3 miles in length in a north-northwest and opposite direction, 2 miles in greatest width, and has an area of 9 square miles with a level surface, from 40 to 60 feet in height, a steep shore all round, and deep water in many places close-to, except on the north and northwest sides. The island, which has a population of about 25,000, contains fertile plantations, chiefly of coconut palms.

Ras Serani, the western point of entrance to Port Mombasa, is cliffy and 66 feet high, with a battery close eastward of it; reef and shoal water extends nearly 200 yards southward of the point.

Leading lights are exhibited on Ras Serani, the rear structure, 42 feet in height, being an iron tower with black and white bands; the front light is shown from a black and white pillar 21 feet in height, and the tower and pillar are in line bearing 302°.

The rear light, exhibited at an elevation of 85 feet above high water, is flashing white, visible 15 miles; the front light, fixed red, is shown at an elevation of 68 feet above high water, and is visible 8 miles. For arc of visibility of both lights, see Light List. This light has been extinguished temporarily.

Signal station.—Vessels can communicate by the International Code with a signal station, consisting of a red rectangular building, 15 feet in height, and situated on Ras Serani.

East shore.—A broad rounded peninsula, of which Ras Kunwongbe, a bluff cliffy point, 70 feet high, is the southeast, and Mackenzie Point, cliffy, and 25 feet high, the southwest extreme, forms the eastern side of Port Mombasa, and fronting the former point are Leven Reefs, extending about 1¼ miles southeastward, and curving around to Mackenzie Point; the sea breaks heavily on the edge of the reefs, which are fairly steep-to on the eastern edge, but slope gradually toward the entrance channel.

Between the reefs and the shore is a boat channel.

Outer anchorage.—The outer anchorage, in depths of from 8 to 10 fathoms, with Ras Iwa Tine 3 miles northeastward, just open of Ras Kunwongbe, bearing 34°, and the front light pillar 291°, is very indifferent on account of their always being a heave, which during the southwest monsoon is considerable.

Port—West shore.—The west shore of the port from Ras Serani trends north-northwestward for ¾ mile to the commencement of the town, and then curves around for a similar distance to Ras Kiberamini, forming a bay, receding westward about ½ mile and nearly filled with drying sand bank, its shores being thickly covered with coconut palms; between Ras Serani and the town, the shore is fringed with reef and shoal water nowhere more than 200 yards off.

Northward of Ras Kiberamini another bay is formed of a similar width to the preceding, its northern point being Ras Makawe Jiwe, from which the shore turns northwestward to the north point of the island.

East shore.—From Mackenzie Point the east shore trends north-northwestward for ½ mile to Ras Kidomoni, and then forming two small bays to the northward, bends to the westward to Ras Kisaoni, which projects about ½ mile in that direction into the second bay on the opposite shore; northward of Ras Kisaoni another bay is formed, with Ras Makawe Jiwe extending into it from the west shore.

The western portion of Leven Reefs extends nearly ¾ mile southeastward of Mackenzie Point, having on it George Rock, 12 feet high, close to the shore, and a rock drying 10 feet near the edge of the reef, and from Mackenzie Point shoal water, with 3 fathoms and less water, extends southward for 1,200 yards, the western edge of this forming the east side of the channel; the edge of this bank passes about 200 yards westward of Mackenzie Point, with reef immediately within it, but northward of this the points are fairly steep-to, the shoal water being in the bays.

Leading beacons.—Two beacons for leading into the port, are situated in its northern part, the rear beacon, about 400 yards eastward of Ras Kisaoni, being of white stone and 35 feet in height; the front beacon, on Ras Kiberamini, is a pillar with black and white horizontal stripes.

Lights.—When a vessel is entering or leaving the port by night, a fixed red light is shown from the rear, and a fixed green light from the front beacon; the beacons and the lights are in line bearing 346°.

Depths.—The least depth on the line of the leading beacons on Ras Serani is 5½ fathoms, but about 100 yards on the northeast side of the line, and about 1.8 miles southward of Ras Kunwongbe, is a rock with 4¾ fathoms over it; about 800 yards farther in and about the same distance on the southwest side of the line is a patch of 5 fathoms.

The channel leading to the port is about 150 yards in width, between the 5-fathom contour lines, and the depths on the line of leading beacons are from 5½ to 8 fathoms at the entrance, and from 6½ to 8 fathoms at the anchorage off the town, but both southward and northward of the anchorage are deeper veins with from 12 to 18 fathoms.

Lightbuoy and buoys.—A black lightbuoy, showing an occasional fixed green light, is moored on the extreme of the shoal water extending 1,300 yards northeastward of Ras Muaka Singe, this buoy being also on the south side of the entrance to Port Kilindini.

A black can buoy is moored on the edge of the shoal water eastward of the customhouse at the south end of the town.

A red conical buoy, surmounted by a globe, marks the extreme of the shoal water extending 1,200 yards southward of Mackenzie Point.

Pilots can be obtained between sunrise and sunset by making the usual signal, and strangers to the port should not attempt to enter without one.

Tug.—A small tug is available.

Directions.—A large vessel should enter the port at high water or with the first of the outgoing stream, and strangers should always enter with that stream running.

Coming from the southward Andromache Reef may be skirted at a distance of about 1 mile or more, and a course should be steered toward the outer edge of Leven Reefs to bring the light structures on Ras Serani in line bearing 301° by day, or the lights by night, steering for them on that bearing, but neither the light tower nor pillar are easily distinguished in the afternoon without the aid of a glass, although the battery, close eastward on the point, denotes their locality.

From the northeastward skirt Leven Reefs at from 1,000 to 1,200 yards distant, and when the flagstaff at Mombasa bears 314° steer for it until the leading beacons are in line.

The tidal streams meet off Ras Serani, requiring the greatest attention to the steering, at springs, especially if entering during the strength of the outgoing stream, when the race will catch the vessel on one bow and then on the other.

When Ras Kunwongbe bears 40° the vessel will be nearing the turn on to the line of the leading beacons for the port, and the course should be altered in good time, leaving the black lightbuoy off Ras Muaka Singe nearly ¼ mile to the westward, and having brought the beacons in line, bearing 346°, steer for them, which will lead up the fairway of the port to the anchorage.

When nearing Ras Mitani, about 800 yards northward of Ras Serani, the beacons should be opened slightly, keeping to the eastward, and again before reaching the point off which the black can buoy is moored, especially if entering with the ingoing stream, as then there is a decided on-shore set and sometimes a slight tide race.

Anchorage.—A good berth off the town is in a depth of 7 fathoms, over sand and shells, just westward of the leading mark, with Ras Kidomoni bearing 38°, keeping clear of the mooring buoy; or a vessel may anchor farther north in from 10 to 12 fathoms, southwestward of Kisaoni mission station, but in either berth a vessel should moor.

The holding ground is good, but the tidal streams run strongly, and with a fresh breeze vessels swing broadside on between the wind and stream, which occasionally causes heavy jerks on the cable.

Mooring buoy.—A mooring buoy is situated west-southwestward of Ras Kidomoni.

Tides.—It is high water, full and change, in Port Mombasa at 4 h. 0 m.; springs rise 12 feet, neaps rise 8 feet, neaps range 4 feet.

Tidal streams.—The in-going and outgoing streams have about an equal duration, the velocity being from 2½ to 3 knots at springs.

Town.—Mombasa (Mvita), the most important town on this coast, being the headquarters of British East Africa and of trade, has commodious Government offices and residences, but is a labyrinth of narrow, irregular streets and lanes; an old fort southward of the town was built by the Portuguese in 1594 and restored in 1635, while two or three mosques are prominent objects, and there are both Anglican and Roman Catholic Churches, besides a bank, a club, and five hotels in the town.

The administration is in the hands of a British commissioner, whose residence is on the island between Ras Serani and Ras Mitani; and to the southward of the tram line, connecting the town with Kilindini, are a number of European houses and bungalows built in Indian style.

Communication.—British India Co.'s vessels between Bombay and Durban, via Zanzibar, call fortnightly each way, and the following mail steamers, to and from Europe, call monthly: *Union Castle*, *British India*, *Messageries Maritimes*, and *Marittima Italiana.*

The Uganda Railway to Port Florence on Lake Victoria Nyanza, a distance of 584 miles, has two trains weekly to that place from Nakura, to which place there are three trains weekly from Mombasa; the journey between Mombasa and Port Florence occupies about 40 hours, and in conjunction with the trains there is a weekly service of steamers on the lake, the all-round journey taking nine days.

A submarine cable connects Mombasa with Zanzibar, and a land wire extends along the line of railway, another connecting with Lamu to the northward. There is a tramway from the town to Kilindini.

Coal and supplies.—About 2,000 tons of Durban coal are kept in stock, and 300 tons could be put on board in 24 hours, coaling being carried out by baskets, while 23 lighters, with a capacity of from 20 to 130 tons, are available.

There is a plentiful supply of fresh meat, bread, and vegetables, and poultry and fish are easily obtained; the water, which is from wells and poor in quality, is sent off in a water boat. A better water supply for the town is under consideration.

Repairs.—Slight repairs might be effected at the railway workshops.

Hospital.—The Government hospital at Mombasa is the oldest building in the protectorate, and a new building is almost required; but a new hospital at Nairobi, 327 miles by rail from Mombasa, should provide ample accommodation.

Landing.—Two iron piers, one having a steam crane, extend from the shore, abreast the customhouse.

Missions.—The Church Missionary Society have a branch at Mombasa, with a school, the station being at Kisaoni or Freretown.

Climate.—Although warmer than Zanzibar, the climate is drier and less enervating, and improved sanitation and cultivation of the surrounding country would render it one of the healthiest places in the Tropics. The range of temperature is also considerably greater than at Zanzibar.

Winds.—Southeast winds are prevalent during the months of September to October, inclusive, but in December the wind is more easterly to northeast. The day breezes of both monsoons are leading winds for a vessel entering, and a light land wind blows during the night and early morning, being generally steadiest between 6 and 8 a. m., which is the most suitable time for a sailing vessel to leave.

Port Tudor.—Kwamwana Ima, the northern part of Mombasa Island, forms the south shore of Port Tudor, a landlocked harbor, approached from Port Mombasa by a narrow winding but deep channel, with steep wooded banks and most picturesque scenery; the north side of the port has drying banks extending from it and with similar banks to the westward and those extending from the south side the anchoring space is limited to a width of less than 300 yards.

Several channels pass through these banks, one to the northward leading to Mto Jumvu, which may be ascended at high water for several miles, and near its head is the mission station of Rabai.

Anchorage.—The anchorage in a depth of 7 fathoms is in the northeast part of the port, with Ras Makawe Jiwe, open of Ras Junda, bearing 130°, and the points of Makupa boat channel just opening 239°.

Port Kilindini (the meaning of the name being "in the deeps"), a fine sheltered harbor between the southwest side of Mombasa Island and the mainland, is about 3 miles in length, and affording anchorage for all classes of vessels, is used by large steam vessels instead of Port Mombasa.

Southwest shore.—From Ras Muska Singe the southwest shore curves round northwest and north for about 3¼ miles with Mueza Creek nearly midway, the land behind rising abruptly to from 150 to 200 feet, being cultivated in places; the northern part of this shore terminates in a narrow peninsula about ⅔ mile in length, the north extreme being Ras Kigangone (Flora Point).

Northeast shore.—From Ras Serani the island shore trends southwestward for about ¾ mile to Ras Mzimili, and then curves round northwest and north-northwest at distances of from ¼ to ¾ mile from the mainland, and at ½ mile from Ras Mzimili is Mbaraki Creek extending nearly 800 yards to the northward, and almost filled with drying bank.

Ras Kilindini, about 1 mile northwestward of Mbaraki Creek, has on it the customs and railway sheds, and from this the island coast trends north-northwestward for about 1 mile to the northwest point of the island.

Lights.—Near the north extreme of the reef extending about 150 yards northward of Ras Muaka Singe is a white concrete beacon, which exhibits a fixed green light.

A fixed red light is shown from a white beacon on the edge of the reef, extending about 200 yards east-southeastward of Ras Mzimili.

A fixed red light is shown from a white beacon abreast Mbupuni, 600 yards westward of Ras Mzimili.

The above three beacons are each pyramidal in shape and 18 feet in height, the lights being exhibited at an elevation of 8 feet above high water, but they are only lighted when required.

A fixed green light is shown at the landing stage at Ras Kilindini.

Leading lights.—Beacons, fitted with lanterns, from which leading lights are shown, on request being made to the port officer, but not regularly exhibited, are situated as follows:

Two pillars, 400 yards apart, in line 237° and both exhibiting white fixed lights, are westward of Ras Muaka Singe, the front pillar being ¼ mile from that point.

Two beacons on the mainland westward of Ras Kilindini, the rear white and 22 feet high, showing a fixed red light, the front beacon 6 feet high, nearly 100 yards from the preceding, and in line with it when bearing 309°, exhibits a fixed green light.

Dangers.—From Ras Muaka Singe to Ras Bofu, at the entrance to Mueza Creek, shoal water only extends a short distance off the shore, which is steep-to in places, but between this and a point nearly 1 mile northwestward a bay is formed, in the center of which are Kilindini Reefs, about 300 yards in length in a northwest and opposite direction, and drying at low water, springs, with two patches of reef off the south side.

Buchanan Rock, awash at low water, lies 400 yards southeastward of Kilindini Reefs. The remainder of the southwest shore of the port has shoal water extending nowhere more than 100 yards.

On the north side of the entrance, reef and shoal water extends rather more than 200 yards off between Ras Serani and Ras Mzimili, but from that the northeast shore of the port has shoal water off it for only a short distance, until nearing Ras Kilindini, from which shoal water, with depths under 5 fathoms, extends 900 yards in a south-southeast direction, but northward of Ras Kilindini the shore is clear of dangers outside a distance of 200 yards.

Depths.—The depths on the leading line through the entrance are from 11 to 35 fathoms, after which they are from 11 to 18 fathoms in the fairway until northward of Mueza Creek, when a shoal forms a bar from the island to Kilindini Reefs, with a least depth of 6½ fathoms over it on the leading line; northward of this the depths increase to from 11 to 22 fathoms.

Beacons.—In addition to the beacons exhibiting lights, Buchanan Rock is marked by a black tripod beacon, surmounted by a white barrel.

The southeast side of Kilindini Reefs is marked by a stake, the center of the reefs by a black tripod beacon, surmounted by a white barrel, and the northwest end by a black tripod beacon with a spherical topmark.

A black tripod beacon, surmounted by a white pyramidal topmark, marks the edge of the shore bank 400 yards southeastward of Ras Kilindini.

Lightbuoys.—The lightbuoy, showing a fixed green light, moored off the shoal water extending northeastward of Ras Muaka Singe, has been mentioned; it is the outermost buoy on the south side of the entrance to Kilindini Channel.

On the north side of the entrance to the channel a red lightbuoy, exhibiting occasionally a fixed red light, is moored nearly ¼ mile southwestward of Ras Serani.

If for any reason either of these lightbuoys are withdrawn, that on the south side of the entrance will be replaced, without notice, by a black can buoy with a staff and cage, and that on the north side by a red conical buoy, with a staff and globe.

Wharf and pier.—A wharf 550 feet in length, built of concrete blocks, is situated at Ras Kilindini, where some ground has been reclaimed, and at present vessels discharge into lighters which go alongside it, the goods being loaded direct onto the railway trucks. but when the harbor improvements are complete, vessels themselves will be able to lie alongside a deep-water pier.

On the wharf are one 20-ton, two 10-ton, three 5-ton, and two 3-ton cranes.

About 800 yards southeastward of Ras Kilindini is a pier belonging to the Shell Transport Co.

Admiralty property.—A considerable area between Port Kilindini and Mtongwe, southward of the peninsula of which Ras Kigangone is the extreme, belongs to the admiralty for naval purposes, and also at Mkunguni, westward of the same point, and in connection with the former there is a small pier, situated on the mainland about 800 yards southwestward of Ras Kilindini.

Submarine telegraph cable—Buoy.—The shore end of the cable connecting with Zanzibar is marked by a telegraph buoy, situated about 200 yards to the southward of Telegraph Point, midway between Mbaraki Creek and Ras Kilindini.

Signals.—When a vessel is leaving the port a black ball is hoisted at the southwest yardarm of the flagstaff on Ras Serani, and vessels about to enter must not approach within ½ mile of Ras Serani while the ball remains hoisted.

A white ball, hoisted at the flagstaff on the railway pier, signifies that a vessel is approaching the entrance channel, and vessels must not leave their anchorages while it remains hoisted.

Port Reitz (Banderia Kipeyu), entered between Ras Kigangone and Ras Mchangamwe, nearly ½ mile apart, extends about 3 miles westward, its western part having flats and shallows extending a considerable distance from the shore; it has a general width of about 600 yards between the shoal water extending, in the eastern part, ⅜ mile from the shore near Mkunguni. Farther westward it leads to Mto Duruma.

On the north side of the entrance, between Ras Mchangamwe and Mombasa Island, is the entrance to Makupa boat channel, communicating with Port Tudor, and crossed at its northern end by the railway bridge, which has 21 spans of 60-foot girders on iron screw piles, and five spans of 12 feet; a ferry also crosses this channel.

The depths in Port Reitz for the first mile westward are from 6 to 15 fathoms, then from 3¼ to 4¾ for about ¾ mile, deepening afterwards to 5½ to 11 fathoms.

Directions.—Enter from seaward, with the light tower and pillar on Ras Serani in line, bearing 301°, and when the pillar beacons westward of Ras Muaka Singe come in line, 237°, steer for them, which will lead through the fairway of the entrance, but the leading beacons being close together, care is necessary to guard against the current setting obliquely across the entrance; within the port the current follows the direction of the channel.

When Ras Bofu opens of Ras Mbuyuni, bearing 288°, alter course more to the westward, keeping in mid-channel until the second pair of beacons, at the admiralty ground come in line 309°, when steer for them, passing northeastward of Buchanan Rock and Kilindini Reefs. When leaving the port these beacons in line are said to lead too close to Mombasa Island shore.

If intending to anchor in Port Reitz, when Shamanzi, on the east side of the entrance to Makupa boat channel, is well open of Ras Kilindini, bearing 349°, alter course to the northward, keeping in mid-channel until abreast Ras Kilindini, and then somewhat toward the island shore, rounding Ras Kigangone into Port Reitz.

Anchorages.—Good anchorage may be obtained off Mbaraki Creek in a depth of 12 fathoms, over mud, with Ras Bofu bearing 278°, distant 800 yards or closer in if desired, but the tidal streams are strong at this anchorage.

In Port Reitz anchorage may be taken up in depths of from 12 to 15 fathoms, over mud, with Ras Kigangone bearing 115°, distant 800 yards. Anchorage may also be obtained in several other parts, following the plan.

Mooring buoys.—Three red mooring buoys are situated near the Oil Co.'s pier, and a red mooring buoy is about 200 yards southward of Ras Kilindini; a black mooring buoy, about 400 yards westward of Telegraph Point, belongs to the British India Co.

Tides.—The establishment and rise of tide is the same as at Port Mombasa.

Tidal streams.—The ingoing stream into Port Kilindini runs from 3 to 4 knots at springs and 2½ knots at neaps; the outgoing stream has velocities, respectively, of 3 and 1½ knots. In Port Reitz both streams run about 1½ knots at springs and 1 knot at neaps.

Coast.—From Mombasa to Kilifi, the coast, having a general north-northeast direction for 27 miles and consisting of sandy beaches and overhanging cliffy coral points, is thickly wooded as far as Malindi, and fronted by a barrier reef, extending from 1,000 to 1,600 yards from the shore, until 12 miles northward of Matapwa River, with a passage for canoes within, that portion between Mombasa and Matapwa River, being known as the Leven Reefs.

From 12 miles northward of Matapwa River to Mto Senawe, the coast is steep-to, with overhanging coral cliffs about 15 feet high, and on the top of this cliff, about 15 miles northward of Matapwa River, is a conspicuous white sand patch; the coast reef, which is steep-to, nearly always breaks, and there appear to be no off-lying dangers until the reefs off Mto Senawe are reached.

Current.—About 10 miles offshore the current runs northeastward at rates of from 2 to 4 knots during the southwest monsoon, and from 1 knot to 2 knots in the northeast monsoon, but with less strength inshore near the reef.

Matapwa River, approached by a passage through the reef abreast of it, has deep water, but the channel is rather intricate; it was ascended by the boats of the British naval vessel *Swallow* in 1896 for a distance of 6 miles, and about 2 miles within the entrance where there is a ferry, it is crossed by the land telegraph wire.

The least depth in the entrance to the river is 3½ fathoms, and vessels of 11 feet draft have entered.

Mountains.—The Rabai Range, about 8 miles inland from Matapwa River, has five distinct summits, of which Jibana, the highest and northernmost, is 1,087 feet high, but Kambe, 2 miles southwestward of it and 931 feet high, has a clearly defined dome-shaped summit and is very conspicuous; the country between is undulating and wooded, and near the southern summit of the range is the town and mission station of Rabai, the former having 2,000 inhabitants.

Beacon.—A surveying beacon, consisting of a white cone, surmounted by a black inverted cone, stands on Mount Jibana, but in the event of its destruction it will not be replaced.

The Senawe Range, northward of the Rabai Range, is separated from it by a low hill, and Mount Chogni, its southern peak, 1,152 feet high, is rendered conspicuous by a group of palms on its summit; between this mountain and Kauma, a hill to the northward, 978 feet in height, is Kilifi Gap.

About 4 miles northward of Matapwa River commences a coast range from 400 to 500 feet high, with thickly wooded country between it and the shore, and at its southern end are two peaks, the southern, 509 feet high, has a clump of trees on its summit; farther northward along the range, at an elevation of 490 feet, is another peak with a clump of trees.

Blowing Point is about 25 miles north-northeastward of the entrance to Port Mombasa, and the Mto Senawe is 1 mile northward of it, the coast between the point and river being cliffy, from 50 to 60 feet high, and backed by bush and scrub, with a bright sandy beach 400 yards in length, just southward of the entrance to the river. Between Mto Senawe and Kilifi River, 2¼ miles farther northward, the coast is rock bound and reef fringed, the cliffs being from 40 to 60 feet high, with two sandy beaches in its southern part.

Beacon.—About 2¾ miles westward of Blowing Point is Mbogolo (Quoin Hill), rising to a height of 250 feet from the plain; a conspicuous beacon, consisting of a white cone surmounted by an inverted black cone, stands on its summit.

Reefs.—The off-lying reefs in the neighborhood of these rivers are the South, Middle, and North Reefs, lying about 1 mile off-shore; they are no where dry, but a few heads are occasionally visible at low water, springs, on the Middle Reef. In the northeast monsoon they are not nearly so conspicuous as during the southwest monsoon, when they always break, and sometimes during and after heavy weather, to such an extent that the channels between them are not distinguishable.

North Reef fronts the coast for some distance northward of the Kilifi River entrance, its southern extreme being 120° distant 1½ miles from Ras Kitoka, and forming the northern side of the North Pass. A similar horn within it extends nearly a mile southward of the northeastern point of the river, forming the eastern side of the fairway.

Passes.—There are three passes between the reefs, viz: Dhow Channel, between the land northward of Blowing Point and South Reef, is used by dhows and light draft vessels with local knowledge only; Takaungu Pass is about 300 yards wide between the South and Middle Reefs, and North Pass, between the Middle and North Reefs, only 200 yards wide between the 5-fathom contour lines on either side; it is the most direct pass for the Kilifi River.

The depths in Dhow Channel are from 2¼ to 3¾ fathoms; in Takaungu Pass from 13 to 23 fathoms; and in North Pass from 7 to 9 fathoms on the leading marks.

Mto Senawe, about 100 yards wide, runs between rocky bluffs at high water; but at low water the bed is confined to a narrow channel at the side of the northern bluff, all the rest of the bed uncovering, and after winding some 1½ miles inland it is lost in mangrove swamps.

The river is navigable by dhows at or near high water, but the tidal streams are strong, with considerable bubble and disturbance between the entrance and the town; at low water, springs, the British naval vessel *Stork's* steam cutter entered with difficulty, the bottom being rocky with several coral heads.

A ferry crosses the river from the town of Takaungu to the main coast road leading northward.

Directions.—Mbogolo or Quoin Hill, open of Pinnacle Point, the northern point of entrance, and in line with the southern shore, bearing 244°, leads through the Takaungu Pass and up to the river entrance, or to the anchorage off it.

Anchorage.—The anchorage off the river in about 6½ fathoms water over sand, is with Pinnacle Point bearing 238°, distant ⅜ mile.

Takaunga, a walled town, standing in a grove of coconut palms on the southern bank of the river, ½ mile within the entrance, has a varying population of about 1,300, of whom some few are Indian traders. It has several mosques and some 300 or 400 houses and huts, with numerous wells, and is a thriving place.

The fort flagstaff always hoists the Zanzibar red ensign; the district officer's house standing southeastward of the fort being whitewashed, can be seen from a considerable distance to seaward when the river opens. The surrounding country is well cultivated, there being a number of farms in the neighborhood where grain is raised and exported.

Supplies.—Meat is obtainable, and fowls, eggs, and vegetables are abundant.

Kilifi River.—Ras Kitoka, 57 feet high, forms the southern side of the mouth of Kilifi River, the northern side being an abrupt rise to the same height, and then a continued but gradual rise in the rear, where stands the village of Kioni.

Caution.—A factory situated on the edge of a cliff at Kilifi is now running at night, up to midnight, and is strongly lighted with large incandescent lamps. Mariners should be careful not to mistake these lights for those at Mombasa.

Beacons.—The two leading mark pillar beacons, 14 feet high, for the North Pass between the reefs in the approach, stand on the cliffs, 44 feet in height, 1⅓ miles northward of Pinnacle Point; the rear beacon bears 273°, distant about 300 yards, from the front beacon.

Two beacons for entering the river are situated on its north side, the rear beacon, in front of the eastern huts of the village of Kioni, is a stone pillar, 15 feet high and 70 feet above high water, and in front and below it the whitewashed trunk of a cotton tree, whose top limbs have been lopped off, forms the front mark; these in line, bearing 330°, lead from the roadstead into the river entrance, but the whitewashed trunk is often difficult to distinguish.

Entrance.—The entrance channel, commencing about ⅜ mile southward of Ras Kitoka, is about 200 yards in width between the 5-fathom contour line of the reef extending from the mainland and that of the reef stretching ¾ mile south-southeastward of the northern point of entrance.

The entrance to the river lies between cliffs from 70 to 100 feet high, with fringing reefs of slight extent everywhere, except the spit that extends 200 yards northward from Ras Kitoka, and another from the next point inward on the northern side.

Depths.—Kilifi River has not less than 6 fathoms at low water in the passes from seaward between the reefs, but it is not recommended for vessels above moderate draft, as the river channel between the bordering reefs is not above 200 yards wide between the 5-fathom lines. Between its entrance points and Ras Nkoma, 1½ miles within the entrance, the river has depths of from 12 to 20 fathoms; above Ras Nkoma it expands into Bandaria ya Wali, a basin about 1½ miles in extent, of which the western portion is shallow.

Telegraph wire.—The land telegraph line between Mombasa and Lamu via Malindi crosses Kilifi Harbor at a least height of 68 feet above high water, springs, close northwestward of Mnarani village, but is somewhere more than 80 feet above high water near the northern shore.

Directions.—Takaungu Pass, though wider and possibly better. is not so direct for Kilifi as the North Pass, and to enter by it follow the directions given on the preceding page until Kioni Pillar bears 335°, or well open westward of the whitewashed tree below it; steer for it on that bearing until Pinnacle Point bears 218°, when edge to the eastward to bring Kioni Pillar in line with the whitewashed tree, if the latter can be seen, 330°, which mark leads in between the reefs on either side.

Attention should be paid to the set of the tidal streams as before remarked, the in-going stream setting northward across the reefs until well up to the river mouth, and the opposite stream straight out across the reefs.

When nearly abreast of the reef extending south-southeastward from Kioni, the pillar should be open westward of the tree, and when within 800 yards of Ras Kitoka a little open eastward of the tree, to give a wider berth to the reefs. When Ras Nkoma comes in line with the point eastward of it on the northern bank, bearing 288°, round into the river, keeping in mid-channel; Ras Nkoma open of the point on the northern side, about 290°, leads southward of the reef off the point southwestward of Kioni. Anchor off Mnarani, or in Banderia ya Wali, as convenient.

North Pass.—To enter by the North Pass, steer in with the pillar beacons on the cliff 1 mile southward of Ras Kitoka in line bearing 273° until within ½ mile of the shore, when edge northward to bring the Kioni leading marks in line, and then proceed as from Takaungu Pass.

Anchorage.—If not intending to enter the river, anchor about ½ mile from the shore in about 9 fathoms, a little northward of the North Pass leading line, but there is always a ground swell at this anchorage.

There is good anchorage in the river, for vessels that can pass under the telegraph wires, in a depth of 12 fathoms, over mud, with the point southwestward of Kioni bearing 95°, and the western cliff of the valley westward of Mnarani 160°. Vessels with masts too lofty to pass under the telegraph wires must anchor in mid-channel below them, in from 15 to 20 fathoms, where the anchorage probably is equally good.

Tides.—It is high water, full and change, in Kilifi River at 4 h. 0 m.; springs rise 12 feet, neaps 8 feet.

Tidal streams.—The tidal streams in the river run from ¾ knot to 1½ knots, and obliquely across the entrance. In entering or leaving the passes, caution is necessary, as the tidal streams set directly across them, the stream of the rising tide setting to the northward and the other stream to the southward.

Banderia ya Wali, 1½ miles wide, is very shallow, except just within its entrance; its foreshores are reef and mangrove lined, and rise gradually on all sides, the northern and western sides being completely choked with reefs and mud flats. In its northwestern part is the mouth of the Mto Mtanganyiko or Konjoro, a narrow stream which bifurcates about 2 miles up, and leads to the grain-growing centers of the same names, Konjoro being 1 mile to the northward, and Mtanganyiko the same distance westward.

The entrance to the river has a depth of about 1 foot, this depth being more or less continued within, except for some holes of from 1¾ to 2¾ fathoms.

Villages.—Mnarani, the principal village, situated on the tableland on the southern side of the river, has a scattered population of about 300 people, mostly engaged in agriculture, and the old town of Kilifi, the ruins of whose mosques are still visible, was a little farther westward. Kilifi village, with about 70 inhabitants, lies just within Ras Kitoka, from whence is a ferry to Kioni on the opposite side, and Kibokoni village is on the north bank of Mto Mtanganyiko.

Supplies of fowls and vegetables, and an occasional bullock, may be obtained at Mnarani village.

Coast.—From Kilifi River to the Owyombo River, a distance of 16½ miles north-northeastward, the coast is similar to that farther southward, consisting of sandy beaches and overhanging coral cliffs, lines with thick scrub and bushes from 15 to 20 feet high and fringed with coral reef extending from 1,000 to 1,600 yards offshore; northward of Wasa village, 9 miles from Kilifi River, there are red sand cliffs.

Between Kilifi and Owyombo and about 5 miles inland is a range of hills from 600 to 800 feet high, but flat and without any well-defined summit; Dongo Kundu, 815 feet high, is near its southern extreme.

Mount Mangea, 1,776 feet high and 17 miles west-northwestward of Owyombo River, has a fairly well defined summit, the sides sloping gradually. Standing alone, it makes a good landmark in clear weather.

Just southward of the Owyombo River is a conspicuous white sand hill 25 feet high, and at the mouth of the river on the southern bank is a hummock 131 feet high, steep on its southern but sloping on its northern side.

Beacon.—A surveying beacon, consisting of a white cone surmounted by a black inverted cone, stands on the 131-foot hummock and forms a conspicuous mark, being visible from a distance of 12 miles, but in the event of its destruction it will not be replaced.

Owyombo River has an islet 45 feet high in the center of its entrance, and on the northern bank of the entrance are patches of red sand cliffs; the river is only fit for canoe navigation, but dhows anchor inside the island at the entrance.

Coast.—From Owyombo River the coast, trending in a northeast direction for about 11 miles to Malindi Point, is thickly wooded and fronted by a coral reef, which, toward the point, extends 1½ miles off.

Islets—Landmarks.—About 3 miles northward of the Owyombo River and abreast Watamu village are six islets from 50 to 100 feet high close to the shore and backed by a sandy beach, which gives them the appearance of cliffy points; for a distance of 1 mile off these islets the bottom is rocky and uneven.

Just southward of Malindi Point are two long sandy beaches which are rendered conspicuous by the double black coral points which separate them.

Malindi approaches.—Malindi Point is a coral, rounded point, 20 feet high, rendered noticeable by Sail Rock 21 feet high, just off it. Malindi Reef, extending 1½ miles off the land southwestward of the point, dries about 3 feet in places and generally breaks; a passage within the reef is used by small dhows.

Leopard Point.—From Malindi Point to Leopard Point, 2¼ miles north-northeastward, the coast is cliffy, from 15 to 20 feet high, with low wood and scrub; Leopard Point, 64 feet high, is white and sandy, with a conspicuous clump of casuarina trees within it, and a rock 12 feet high stands on the coast reef ½ mile southward of the point. Between Leopard Point and Vasco da Gamas Pillar, nearly 2 miles to the northward, there is a long stretch of sandy beach fronted by reef which dries in places, extending from 1,000 to 1,600 yards offshore.

Landmarks.—Quoin Hill, a wooded, quoin-shaped hill about 200 feet high, about 9 miles northwestward of Leopard Point, shows conspicuously from the eastward, and Single-Tree Hill, used as a clearing mark for the Griffon Patches, is a round-topped hill 569 feet high with a conspicuous single tree on its summit, situated about 9 miles northeastward of Quoin Hill.

Vasco da Gamas Pillar, near the extreme of the cliffy point about 1¾ miles northward of Leopard Point, is 18 feet high, with a cross on which are the arms of Portugal, much weatherworn on the top 25 feet above high-water mark.

Light.—Near Vasco da Gamas Pillar a fixed white light is exhibited, at an elevation of 69 feet above high water from an iron mast, visible 11 miles. (For bearing of arc of visibility, see Light List.)

Leopard Reef, which protects Malindi Road from the eastward, is, with the shoal bank on which it stands, nearly 2¾ miles in length by 1½ miles in greatest width, within the 3-fathom line, and dry in places at low water, its outer edge being 2½ miles from the shore; on the inner edge of the portion which dries is a sand bank awash at high water, springs.

Malindi Bank, the continuation southward of Leopard Reef for 2½ miles within the 5-fathom line, is steep-to on its outer edge, gradually deepening to the southward. There are apparently no shallow heads and the bottom of sand and coral can be easily seen up to a depth of 8 fathoms; heavy tide rips and overfalls are met with at its edge.

Griffon Patches.—Shallow water, known as the Griffon Patches, extends from about 1¼ miles southeastward of the sand bank on Leopard Reef for nearly 2½ miles to the northward, with from 2¼ to 5 fathoms, over coral. Single-Tree Hill, in line with the guardhouse on the northern bank of the Sabaki River, bearing 323°, leads northeastward of all these patches.

North Reef, lying from ½ mile to 1 mile off Leopard Point and having a sand bank on it which dries 10 feet, affords some shelter from northerly winds to Malindi Road.

Pillar Reef fringes the coast between North Reef and Malindi Town for a width of 800 to 1,000 yards, but off Vasco da Gamas Pillar the water is shallow for about 1,400 yards; the sea nearly always breaks on its edges.

Malindi Road, surrounded and sheltered by the reefs described, is the anchorage between Malindi and Leopard Points; it is entered from the southeastward over Malindi Bank, or from the northeastward by Stork Passage. A coral patch awash at low water, springs, lies on the eastern side of the road, 800 yards southward of North Reef.

The least depth in the southeast entrance is 6¼ fathoms, and in Stork Passage the depths are from 6 to 9 fathoms at 300 yards along the eastern edge of North Reef; at the anchorage they are from 6 to 6½ fathoms.

Directions.—To enter Malindi Road from the southeastward, bring the summit of Single-Tree Hill in line with the clump of casuarina trees on Leopard Point, bearing 341°, which leads in with not less than 3¼ fathoms at low water over Malindi Bank and into the road. When Sail Rock opens off Malindi Point, bearing 220°, steer 40° with it as a stern mark for the anchorage.

Stork Passage, the northern entrance to Malindi Road, between Leopard and North Reefs, is from 600 to 800 yards wide and apparently clear of danger. From the southward bring Single-Tree Hill in line with the guardhouse on the northern bank of Sabaki River, bearing 323°, which will lead northeastward of Griffon Patches, and then steer to pass eastward of North Reef, which can generally be easily seen, and along its edge from 200 to 300 yards distant. Sail Rock, just open of Malindi Point, bearing 220°, leads through the passage in not less than 3¾ fathoms until nearing the southeast edge of North Reef, to clear which the course must be more to the southward.

Anchorage.—The anchorage, in a depth of 6½ fathoms, over sand and coral, is with Sail Rock open of Malindi Point, bearing 220°, and the clump of casuarina trees, on Leopard Point, 318°.

Malindi.—From Vasco da Gama's Pillar the coast bends round northwestward and north-northeastward for 3¾ miles, forming a bight, on the southwest short of which is Malindi town. A patch, with a least depth of 1 fathom on its northern part and which breaks at low water with any swell, lies in the bight 1½ miles northward of Vasco da Gama's Pillar.

Beacons.—Two beacons, 300 yards apart and in line bearing 271° lead between the northeast extreme of Pillar Reef and the 1-fathom patch, the rear beacon being a white stone pillar 26 feet in height. The front beacon is a stone pillar about 25 feet high and situated on ruins which are northward of the town.

Directions.—Mount Mangea, 1,776 feet high, situated 24 miles westward of Malindi, is a good landmark when making the coast about Malindi from the southward, and on a nearer approach Vasco de Gama's Pillar and the light mast, with a conspicuous white sand hill northward of Sabaki River, will be seen. Having given a good berth to Griffon Patches and Pillar Reef, bring the beacons in line 271° and steer for them until the flagstaff on the fort bears 215°, when alter course for it, which will lead to the anchorage.

Coming from the northward after passing Ras Ngomeni, the hills northwestward of Mambrui, having on them a conspicuous tree, the white sand hill northward of Sabaki River are landmarks, and the flagstaff on the fort at Malindi bearing westward of 215° will lead southeastward of the 1-fathom patch, and on that bearing will lead to the anchorage.

Anchorage, in about 5 fathoms water over sand and coral and protected by Pillar Reef from the southward during the southwest monsoon, may be obtained with the fort flagstaff bearing 215°, and a conspicuous bluff on the west shore of the bight 326°; the depths decrease gradually, but it is advisable not to go into less than 5 fathoms on account of the swell.

Tides.—It is high water, full and change, at Malindi at 4 h. 5 m.; springs rise 12½ feet, neaps rise 9¼ feet; neaps range 6¾ feet.

Current.—Off Malindi, outside the reefs, and within the 100-fathom contour line, a nearly constant current of ¾ knot to the southward was experienced during the months of November and December, but outside the 100-fathom contour the current is north-going with a rate of 1 knot during the northeast and of 3 knots during the southwest monsoon.

Town.—The town of Malindi, visited by Vasco da Gama in 1498, on his first voyage, is straggling, with several fair-sized houses, and is built on a coral beach; it is the capital of the district, and is under the control of a British official.

The customhouse, a low building with a red roof, is very conspicuous from seaward, and a small fort has a flagstaff which usually hoists the Zanzibar ensign; the town has from 4,000 to 5,000 inhabitants and the district about 20,000.

Communication.—Mail communication is via Mombasa, with which place Malindi is connected by a land wire.

Supplies of provisions are abundant, beef, vegetables, fish, fowls, and eggs being all obtainable at reasonable prices, and the market is near the center of the town. The water supply, from deep wells of ancient construction, is good.

Trade.—Malindi is the most productive district on the coast, and large quantities of Indian corn, millet, sesame, copra, and rubber are exported.

Coast.—A long stretch of sandy beach, backed by a range of sand hills about 50 feet high, extends from Malindi to Sabaki River, which is shallow and only available for canoes; the mouth, fronted by a rocky ledge, dries at low water. Northward of the river the land rises to a coast range forming Mambrui Point, and near the southern end of the range is a conspicuous white sand hill 145 feet high, which shows out well from seaward and has already been mentioned as a mark.

Mambrui Point, 2¾ miles northeastward of Sabaki River, has a reef, which usually breaks, extending nearly 1 mile off it, and on the north side of the point is Mambrui village, which, with adjacent villages, has about 1,250 inhabitants; the village, of recent growth, is remarkable for a curious leaning pillar, about 20 feet high, the origin of which is unknown, and in the center of the village is a conspicuous white house and a tree.

Coast.—From Mambrui to Ras Ngomeni, the extreme of a peninsula nearly 10 miles north-northeastward of Mambrui, the coast is sandy with low sand hills and bushes, and the fringing reef extends off from 1 mile to 1½ miles in places. The country is flat between the coast and Single-Tree Hill.

Anchorage.—Southward of Ras Ngomeni and within an isolated reef, good anchorage will be found in depths of 5 or 6 fathoms, over sand, the entrance between the reefs being 400 yards wide. To enter, bring the summit of the peninsula of Ras Ngomeni, 160 feet in height, bearing 332°, and steer for it, passing between the reef extending from the southern shore and the southwest end of the detached reef, and when the east extreme of the ras bears 42° steer for it on that bearing and anchor as convenient; smooth water may be found at the anchorage when there is considerable swell outside.

Ras Ngomeni is cliffy, 15 feet high, and the extreme of a peninsula about 4 miles long; a hill 69 feet high lies close within the point, and the summit of the peninsula 2 miles to the westward is 160 feet high, with two conspicuous white sand slopes on its northern face.

CHAPTER XI.

FORMOSA BAY TO MTO YA VUMBU.

Formosa (Ungama) Bay, contained between Ras Ngomeni and Ras Shaka, which are 34 miles apart in a northeast and opposite direction, recedes about 12 miles from that line, the country immediately within the coast being flat and covered with mkoma palm woods and prickly acacia jungle, with large open spaces apparently under water when the rivers are in flood; between Ngomeni and Kipini, a distance of 32 miles, the coast tract is uninhabited during the greater part of the year.

The dangers to navigation in the bay are the Mwamba Zeboma or Pamamba Shoals in the southern part, and the Mwamba Zewoyu or Ozi Reef in the northern part, with an unnamed bank of from 4¼ to 5 fathoms between. The Rivers Kalifi, Tana, and Ozi enter the sea in Formosa Bay, and there are several creeks in the southern part.

Water.—Fresh water may be obtained almost anywhere by digging a very short distance inland.

Coast.—Westward of Ras Ngomeni the rocky coast gives place to sandy beach, and, turning to the northward, forms a bight into which the Mto Rasini discharges.

From this the beach continues northward for 15 miles to the mouth of the Mto Kalifi, the low sandy shore being covered with mangroves and casuarinas and backed by creeks and swamps.

Northward of the Mto Kalfi mouth the coast consists of sand hills and inclines gradually to the eastward past the mouths of the Tana and Ozi Rivers; from thence to Ras Shaka, the eastern extreme of the bay, low red cliffs and sandy beaches predominate, backed by ridges thickly covered with mkoma palms.

Landmarks.—Single-Tree Hill, within Ras Ngomeni, can generally be made out and on a clear day a distant tableland without feature may be distinguished stretching away inland, but the only objects on the coast between Ngomeni and Shaka are some high mangrove clumps within Ras Kitua, the hills near the mouth of the Tana and the hills within Ras Shaka.

Marereni, off which there is indifferent anchorage during the northeast monsoon, under the lee of the largest of the Zeboma Reefs, is a small fishing village 8 miles northward of Ras Ngomeni, the telegraph line between Malindi and Lamu passes near it. Inland is a desolate and waterless bush in which big game is plentiful, which is yearly frequented for a few months by people collecting marereni weed in the forest, hence the name.

Mwamba Zeboma, or Pamamba Shoals, off Marereni, are several patches which break heavily and uncover at low water; the outermost lies about 5 miles from the beach, but less than 5 fathoms will be found about 8 miles offshore. The summit of Ngomeni Peninsula, bearing westward of 214°, leads eastward of all danger.

Mto Kalifi, 7 miles northward of Marereni, and described as a deep and rapid stream, flowing from Lake Karawa, can not be approached from the southward on account of Mwamba Zeboma; the conspicuous sand hill 1¼ miles northward of the entrance bearing 280°, leads toward the entrance northward of these dangers.

Tana River, rising in the western slopes of Mount Kenia, flows for about 300 miles to the southward, to Fort Hall, being only a mountain torrent in its upper part, but becoming a river of some volume before reaching that place, where it is spanned by a suspension bridge; it then turns to the northeastward as far as Hameye, passing through an uinhabited country of open plains and over six falls.

In its course it receives several tributaries and at its junction with the Mutonga the banks become inhabited and cultivated, but after that the banks are dense bush to Hameye, and from some distance above this place to the sea, a distance of about 400 miles, practically no tributary enters it.

The mouth of the river is difficult to distinguish, but the neighborhood may be recognized by a range of hills, from 108 to 140 feet high, which lie about 2 miles westward of it. Within its mouth the river runs nearly parallel to the coastline for about 6 miles, and then turns to the northward to Charra, where at about 3½ miles in a direct line from the coast there is a customhouse; the river is connected from this place with the Ozi River by the Belaso Canal, narrow, and about 2 miles in length.

The soil is very fertile in most parts, and rice and coconuts are grown on the banks of the lower river, the lower reaches of which are believed to be exceptionally fertile. The lower river is inhabited by the Wapokomo Tribe, who possess numerous canoes with which they navigate it; fish are abundant, also crocodiles and hippopotami.

The flood of the lower river begins in April and May, and when the rains commence on the coast extensive swamps are formed in the low-lying country; at certain seasons the river floods both banks for the last 100 miles of its course. In November and December there is another and lesser rise and in some part of the lower river there is a maximum rise of 8 feet. The river has been ascended in a small steamer of 2½ feet draft as far as Hameye.

During the northeast monsoon, with the tide suiting in the early morning, launches drawing up to 6 feet could probably enter.

Bank.—A bank about 2 miles in extent, with a least depth of 4¼ fathoms, lies 4 miles southeastward of the mouth of the river, and the discolored river water, during the outgoing stream, sometimes extends out to it.

Communication.—A Government steam launch makes periodical trips up the navigable part of the river, but, owing to the changing nature of the channels and the numerous snags, difficulties are frequently experienced. The telegraph wire suspended by posts crosses the mouth of the river.

Ozi River, the mouth of which is about 17 miles east-northeastward of that of the Tana, has on its western point of entrance a conspicuous triangular wooden beacon, 116 feet high, with a similar beacon on its north bank within, the telegraph wire being suspended between them across the river; a conspicuous clump of trees is situated on the point westward of the western beacon.

On the eastern point of entrance is Kipini village, a cluster of Swahili huts, surrounding an Arab fort; there is also a small stone pillar on this point, but it is difficult to make out. About 8 miles up the river, which loses itself in mangrove swamp, is Kau village, similar to Kipini, and about the same distance westward the entrance to Belaso Canal.

Depth.—In 1912 there was a depth of 1¼ fathoms at low water on the bar at the entrance to Ozi River.

Anchorage may be obtained off the river in a convenient depth for the vessel's draft, with Kipini village bearing about 355°.

Villages.—Kipini village has about 1,000 inhabitants and Kau about 800, both being markets for the produce of the rich valley of the Tana, which is brought by native boats through the canal. Witu, the capital of the Sultanate of the same name, is reached by the shortest road from Kau; it has a population of about 6,000, the flat country round it being cultivated chiefly in cotton.

Ras Shaka, the northeast point of Formosa Bay, situated 5½ miles east-southeastward of the Ozi River, is low and rocky with a ridge within it covered with palms and jungle and 174 feet high; the point is surrounded by a fringing reef dry at low water, with islets and sunken dangers fronting it to a distance of about 5½ miles in a south-southwest direction.

Mwamba Zewoyu (Ozi Reefs), the southwesternmost of the dangers off Ras Shaka, consist of two lines of rocks nearly parallel to one another and connected toward their northern ends by a flat; the outer line which terminates at its southwest extreme, in a detached patch of 2½ fathoms, over sand and coral, covers at high water, springs, and at that time is difficult to distinguish, so that in thick weather or at night they should be given a wide berth.

The inner line is a succession of rocky islets, the highest being 14 feet above high water, springs, and southwestward of it are several heads which cover and uncover, the most distant being 1¾ miles off. Between these rocks and Kipini are some shallow patches forming Lockyer Shoal.

Mwamba Mazarui, northeastward of Mwamba Zewoyu, the outer part nearly 3 miles offshore, dries 4 feet at low water and is usually marked by breakers.

Kipini Flagstaff, the hill over Ras Shaka, and the rock 14 feet high, should afford sufficient marks for rounding these dangers in safety. Kipini or the mouth of the Ozi River, bearing 355°, leads westward of all danger.

Anchorage in depths of from 4 to 5 fathoms with good shelter from the sea may be found on the western side of Mwamba Zewoyu, about 1¼ miles west-northwestward of the highest rock. It should be approached with the right extreme of the land 3 miles north-northeastward of Ras Shaka bearing 35°.

Tides.—It is high water, full and change, at Mwamba Zewoyu at 4 h. 8 m.; springs rise 10¾ feet, neaps rise 6½ feet; neaps range from 3½ to 5½ feet.

Coast.—About 4 miles northeastward of Ras Shaka and close to the shore is a conspicuous sand hill 180 feet high, with a white sand patch on the sea face, and 5½ miles farther in the same direction a sand hill 174 feet high has a sharp bowlder on its northern side; at 2½ miles farther, or about 12 miles northeastward of Ras Shaka, is the sandy peninsula of Ras Tenewiati.

Midway within this coast line is a hill 237 feet, and there are sand hills varying from 50 to 180 feet in height; the sand hill 174 feet high, the hills of Dongo Kundu at the entrance to Lamu Bay, and also the hills on Lamu and Manda Islands, are all good landmarks.

Tenewi Islets, generally conspicuous, showing black against the land are a line of rocky islets from 5 to 40 feet high on a reef about 1½ miles southward of the Ras Tenewiati; there are no dangers seaward of them, but the space between the islets and the ras is blocked by reefs.

Kanyika, a rocky islet 26 feet high. 4½ miles northeastward of Tenewi and 2¼ miles offshore, has shallow water extending about 2¾ miles southwestward from it. Between Ras Shaka and Kanyika Islet the coast is fronted by sunken dangers to a distance of about 2½ miles and should be given a wide berth.

Anchorage.—During the northeast monsoon good anchorage may be found in a depth of about 6 fathoms on the western side of

Tenewi Reef by entering from the southward, with the conspicuous hill 174 feet high bearing 306°, which leads about ½ mile southwestward of the reef. When Kanyika is seen open westward of Tenewi, bearing about 56°, alter course to 39° and anchor under the lee.

Lamu Bay is 6½ miles wide between Dongo Kundu and Ras Kitao, the southwestern point of Manda Island, but is partially obstructed by sand banks with from 1½ to 4 fathoms water, and in the southwest monsoon a swell sets in, but during the other season there is good shelter westward of Lamu Bar.

Dongo Kundu, the western shore of the bay, is a rounded peninsula rising to 221 feet and having on it conspicuous white sand hills, while Ras Kitoa, the extreme of the southwest part of Manda Island, which forms the eastern shore of the bay, is low, rocky, and backed by brush; both sides are bordered by shallow water.

The least depth on the leading mark for entering the bay is 5 fathoms, and from 6 to 7 fathoms within Seymour Bank, decreasing gradually to the shore.

Lamu Island, about 6½ miles in length, is low, flat, and cultivated with coconut palms; its southern shore, composed of sand and forming a gentle sweep inward, is backed by white sand hills partly covered with scrub and ranging from 30 to 250 feet high, the latter height being near the western end, while the hills over the village of Shella, at the eastern end, are 175 feet high. A channel named Mlango Kipungani separates Lamu Island from the mainland.

Signal Station.—Steam vessels are signaled from a flagstaff on a sand hill 170 feet high on the southeast side of Lamu Island.

Dangers.—Reef and shoal water extending from the southwest end of Lamu Island in a southerly direction also fronts the northeast side of Dongo Kundu to a distance of about 2 miles.

Kitao Knolls are coral patches lying off Ras Kitao; the outer and southwesternmost patch, with 2¾ fathoms over it, lying 3⅓ miles south-southwestward of the west extreme of Ras Kitao, and at 1 mile east-northeastward of this danger is Utende Rock, with 1½ fathoms, on which the sea only breaks in the heaviest weather.

Seymour Bank, an uneven bank of sand with a least known depth of 3 fathoms, which probably varies with the monsoons, lies with its northeastern end 1¾ miles from Ras Kitao and its inner edge about 2 miles from the shore of Lamu Island.

Directions.—Approaching Lamu from the southward, the white sand hills on Dongo Kundu are conspicuous, but those on Lamu Island are still more so, the whitest hill of all being the easternmost, which is at the entrance to Lamu Harbor. Kanyika Islet when open of the land is also a good landmark.

To enter the bay steer for the signal flagstaff on the west side of the entrance, in line with the black octagonal pillar bearing 15°, which is also the leading mark for entering the harbor, and leads between Kitao Knolls and Seymour Bank in a least depth of 5 fathoms, and when the southeast extreme of Manda Island bears 67°, steer 331° between Seymour Bank and the bar to the anchorage. Lamu Island is sandy and may thus be known from Manda Island, which has grassy plains covered with low trees and thick bushes.

Anchorage.—The anchorage in Lamu Bay in a depth of 30 feet, with the black pillar bearing 45°, and the south extreme of Manda Island 92°, is sheltered during the northeast monsoon, and the tidal streams are scarcely felt.

Lamu Harbor, between Lamu and Manda Islands, is long, narrow, and above Shella encumbered with shoals, but vessels of 20 feet draft can enter with caution, and those of 23 feet if it was properly beaconed and buoyed, but there are no natural leading marks and the artificial ones only lead to an anchorage immediately within the entrance.

The western side of the entrance is a point on which is a sand hill 170 feet high, with Shella village just to the northward of it. Manda Island, the southwest point of which forms the eastern side, is covered with brush and scrub and is sparsely populated; about ½ mile northward of Ras Kitao where the cliffs cease is a small battery.

Dangers.—Diamond Spit, which dries 4 feet, extends about 1,200 yards south-southwestward of the western point of entrance and is continued by shoal water with depths under 18 feet for a farther distance of 1,600 yards in a southerly direction.

On the eastern side shoal water with depths of and under 18 feet extends ¾ mile southwestward of Ras Kitao.

Bar—Entrance.—The bar formed between Diamond Spit and the shoal extending from Ras Kitao is about 150 yards in width, the channel being fairly straight, but narrow; the bottom on the bar is sand and weeds, probably overlying rock on the eastern side, and the sea breaks on both sides of it with a swell from the southward.

Depths.—The least depth on the bar is 18 feet on the line of the leading beacons, but immediately to the westward of this line there is a depth of 15 feet on the edge of the continuation to the southward of Diamond Spit; at about 1,200 yards within the bar the depths increase to from 35 to 43 feet.

Beacons.—An octagonal black pillar 25 feet in height stands on the southeast extreme of Lamu Island, on the western side of the entrance, and is in line with the signal station flagstaff, bearing 15°.

On the opposite side of the harbor about ¾ mile east-northeastward of the black billar is a second pair of leading beacons, both of white stone; they are in line, bearing 47°.

Chapel Rock, which dries $8\frac{1}{2}$ feet, is situated a short distance northward of Shella and is marked by an iron pole beacon 10 feet in height surmounted by a white triangle.

Directions.—Steer with the first pair of leading marks in line bearing 15° until the battery northward of Ras Kitao is in line with Manda Peak, bearing 72°, when edge to the eastward to bring the second leading beacons in line, bearing 47°, which will lead to the anchorage.

The ebb stream sets strongly toward Diamond Spit and the leading marks and bearings given must be carefully observed.

If intending to proceed farther up the harbor, incline toward the Shella side when the black pillar bears southward of 276°, and when the fort at Lamu opens of the square building on the point at Shella, bearing 328°, steer about 17° to pass about 200 yards eastward of Chapel Rock Beacon.

When Chapel Rock Beacon is in line with Shella Hill flagstaff bearing 211°, alter course to about 336°, keeping about 400 yards off the mangroves on the northeast bank, which should lead a vessel in midchannel to the anchorage.

The mangrove points must not be trusted for fixing a vessel's position, but Shella flagstaff, Lamu Fort flagstaff, a tall conspicuous coconut tree on the north point of Lamu Island, shown on the plan, and the two conspicuous white Government houses at the town are useful marks.

Anchorages.—The anchorage near the entrance is in a depth of 25 feet, with a black pillar bearing 274°, and the west side of the southwest extreme of Manda Island 197°; this is the most roomy berth in the harbor. The anchorage outside the harbor is not convenient during the southwest monsoon as communication by boat is difficult if not dangerous.

On the east side of the river opposite Lamu Town anchorage may be obtained in a depth of 24 feet, with Lamu Fort bearing 256° and the signal station flagstaff near Shella 176°.

Tides.—It is high water, full and change, at Lamu at 4h. 40m.; springs rise 11 feet, neaps 7 feet; neaps range 3 feet. At the bar it is high water 20 minutes earlier.

Tidal stream.—The tidal stream runs about $2\frac{1}{2}$ knots at Shella and much stronger than at Lamu, especially with a northerly wind.

Creeks.—Mlango Kipungani, the channel which separates Lamu Island from the mainland, is deep enough for large boats at low water, springs; the southern and western portion, as far as Matadoni on the north side of Lamu Island has general depths of from 2 to 3 fathoms at low water; but about 1 mile eastward of Matadoni there is a bar right across with 6 feet of water only, near which place the ingoing streams meet. The entrance of this channel from

Lamu Bay is impeded by a shallow bar on which there is considerable sea during the southwest monsoon.

Mlango Nkunumbi, extending northwestward from Dongo Kundu, has a low-water depth of about 1 fathom for about halfway up to Nkunumbi village, from which it shoals gradually to 1 foot or 2 feet off the village.

Town.—Lamu, the capital of the Province and situated on the eastern side of Lamu Island, about 3 miles above the bar, has a harbor frontage of about ⅔ mile, and stands on a slight eminence; it has a labyrinth of narrow streets, with a number of stone mosques, and is the residence of a subcommissioner, the population of the town being about 7,000 and of the island 12,000.

The old fort is now used as a barracks and prison.

The principal villages on the island are Shella, Kipungani, and Matandoni, but none are of much importance.

Communication.—Steamers of the British India Co. call monthly, and there is considerable dhow traffic; the town is connected with Mombasa by a land telegraph wire and with Witu by telephone.

Supplies.—Bullocks, sheep, poultry, vegetables, and fruit (especially mangoes) are abundant; the water from wells at Shella or Lamu and only suitable for washing purposes or for boilers, can be brought off in open boats.

A dhow-building yard is situated at the southern end of the town, and a steam launch and an iron lighter are available.

Landing.—The best landing is at the pier, but at low water it is very shallow off its end; there are no steps, but merely iron rings between two uprights.

Trade.—Lamu is declining in importance, its trade having been diverted to Mombasa; rubber, hides, ivory, sesame, and mat bags are the principal articles exported.

Winds.—The northeast and southwest monsoons blow regularly along this coast, but close inshore the wind draws in during the daytime, and a land wind prevails at night. In January the wind varies from northeast to southeast generally fresh, though at times light, and it is usually somewhat hazy.

Currents.—The north-going current off Lamu is stated to be uncertain in strength, but this applies chiefly to the northeast monsoon, when the northerly and southerly currents meet somewhere between Lamu and Castle Point, about 60 miles to the northward. The general northerly set between Mombasa and Lamu is from 2 to 4 knots during the southwest monsoon and from 1 knot to 2 knots during the northeast monsoon. There is a strong indraft with the in-going stream into Manda and Patta Bays.

Manda Island, about 6 miles in length, separates Manda Bay from Lamu Harbor, and has only a population of from 200 to 300 poor villagers, but the extent of the ruins and size of the stone remains attest the importance of the old Portuguese town that once flourished on its northern coast.

A few low hills are seen along its sea face, the lower parts of which are of sand, but of a much yellower hue than the hills of Lamu. Manda Peak, 115 feet high, lies midway between Ras Ukove and Ras Kitao.

At certain seasons the plains of the island abound with game, partridges, antelopes, etc.

Ras Ukove or Manda Head, the eastern extreme of the island, is a low, rocky point fronted by the shoal Mwamba Tawangu to a distance of 1¼ miles.

Ras Kilindini, the northeastern point of Manda Island, 2¼ miles north-northwestward of Ras Ukove, is low and sandy with some tall casuarina trees along its beach.

Manda Toto, an island, consisting mainly of mangroves, on the reef extending from the coast between Ras Ukove and Ras Kilindini, has trees on it about 35 feet high, which are fairly conspicuous; its eastern coast is rocky.

Manda Roads, a space extending in an east-northeast direction from the east side of Manda Island, for a distance of about 5 miles with a general width of about 1¾ miles, is formed between a line of dangers extending along its south side and another line on the north; it has two entrances, Muhaji Channel from the southward and Barracouta Channel from the eastward.

Depths.—The least depth in Muhaji Channel is 6 fathoms and in Barracouta Channel 11 fathoms, on the lines of the leading marks, while at the anchorage the depths are from 8 to 14 fathoms.

Dangers—South side.—Presgrave Bank, about 2 miles off the southeast side of Manda Island, consists of detached banks of coral about 2½ miles long in a north-northeast and opposite direction, within the 5-fathom contour line, and having a least depth of 3 fathoms on two patches.

Mchangamneni, between Presgrave Bank and Manda Island, is a coral shoal 1½ miles in length in a northeast and opposite direction within the 5-fathom contour line, with detached patches of from 1½ to 3 fathoms.

Neither of these banks shows in any way unless close to them, and a strong indraft is reported toward them.

Vidal Bank, east-northeastward of Presgrave Bank and about 3¼ miles in length in that and the opposite direction, within the 5-fathom contour line, has several patches on it with from 2¾ to 3 fathoms, but, as the bottom is very uneven, there may be other shoal patches than those marked on the plans. On the bank the water is always clear, but the bank does not otherwise show.

North side.—Mwamba Tawangu, a bank with depths of a few feet and rocks on it, being the continuation to the south-southwestward of the reef on which Manda Toto Island stands, has been mentioned with Ras Ukove.

Clark Patch, a knoll with 4¾ fathoms, lies about 1,600 yards eastward of the eastern extreme of Mwamba Tawangu.

Mwamba Hanawi (Patta Rock), a coral reef awash at low water, lying 1½ miles northward of Vidal Bank, is surrounded by a considerable area of shallow water, and the sea generally breaks heavily at all times of tide. The passage between Mwamba Hanawi and Mwamba Kwiyeye is useless for navigation.

Patta Island, northeastward of Manda Island, is about 14 miles long in an east-northeast and opposite direction, from 4½ to 6 miles wide and about 50 feet high; it is nearly surrounded by mangroves with a central plateau of raised coral, principally cultivated with coconut palms. The island is quite featureless, the tops of the trees forming one uniform line being all that is visible from seaward. The population of the island is about 13,000.

Directions.—To enter Manda Roads the following objects are useful as leading marks: Chindikasi Islet, formed of mangroves and situated on the reef extending from the western side of the south part of Patta Island, and Pazarli Rocks, 35 feet high, on the northeast end of Mwamba Kwiyeye.

If entering the roads by Muhaji Channel, over the 6-fathom ridge connecting Presgrave and Vidal Banks and coming from the southward, bring Pazarli Rocks to bear 14° and steer for it; if from the southeastward the southwest side of Chindikasi Islet in line with the northeast side of Manda Toto Island 331°, leads over the ridge.

From the eastward through Barracouta Channel the signal flagstaff on the 170-foot hill on the southeast end of Lamu Island, in line with the dip to the northward of Manda Peak, bearing 259°, leads in.

Manda Bay, between Manda and Patta Islands, and at the entrance of a large mangrove-lined creek that trends many miles inland, is a capacious and sheltered anchorage available for all classes of vessels and with deep water in its approach, and is connected with Lamu Harbor by Mlango Mkanda, a tortuous passage northward of Manda Island, available for boats at half flood.

Mongoni and other great creeks which extend inland from Manda Bay have only been partially explored; they are not fed by any large river and the navigation of them appears intricate, but Siyu Channel, on the northern side of Patta Island, connects Manda and Kwyhu Bays.

Depths.—The least depth in the entrance to Manda Bay from Manda Roads is 5¾ fathoms, and the anchorage is in 6 fathoms.

Dangers.—The dangers on the southwest side of the entrance to Manda Bay, consisting of Clark Patch, Mwamba Tawangu, and Manda Toto Reef, have been described.

Northeast side.—Gordon Reefs, with about 2 fathoms least water, are of coral, and lie on the eastern side of the fairway between it and Mwamba Kwiyeye; they do not show.

Mwamba Kwiyeye, stretching 3 miles east-southeastward from Ras Chongoni, the south extreme of Patta Island, dries in patches at low water, springs, and on its northeast edge are Pazarli Rocks, 35 feet high, which are several large masses of coral, generally to be distinguished, the easternmost being the highest.

Iwe-la-Manda, an isolated mass of coral 25 feet high, on the western side of Mwamba Kwiyeye, and sometimes difficult to distinguish against the background of trees, has a chain of flat rocks dry at half ebb, extending from it in the direction of Manda Toto Island nearly into the narrows of the channel into Manda Bay.

The sea breaks on the southern extreme of Mwamba Tawangu, abreast of the Gordon Reefs, but its eastern edge for 1½ miles to the northward is not well defined. Farther in the edges of the reefs on both sides are tolerably steep-to, and at low water fairly defined, but too much confidence must not be placed in this, as the water at times is discolored. The point of the sand bank extending northward from Manda Toto Island is steep-to, but owing to the bubble of a sea caused by the tidal stream it is not visible.

Directions.—The best time to enter the channel is at low water, when most of the reefs can be seen, and no stranger should enter with an ingoing stream; with the wind against the stream the channel is sometimes unsafe for boats.

Entering Manda Bay from Manda Roads; steer for Pazarli Rocks on course 14°, until Mark Inlet is just open eastward of Chaka Mzungu Islet and seen between the other islets, bearing 327°, which bearing as a course leads eastward of Clark Patch and through the narrows between Manda Toto and Mwamba Kwiyeye.

Mark Island, Chaka Mzungu, and other islets lying westward of Patta Island are clumps of mangroves, and Mark Island being small and its mangroves extending westward they reduce the gap, which was reported as impossible to be distinguished as a leading mark, but a perceptible dip at the right extreme of Chaka Mzungu Islet was used as a leading mark, being kept on the same bearing. The mangroves have also extended from other parts, so that bearings taken of mangrove points should not be relied on.

When Iwe-la-Manda bears 100°, steer 280°, rounding toward the anchorage off Kilindini Creek when its eastern point bears 212°.

Anchorage—Landing, etc.—The best anchorage in Manda Bay is off Kilindini Creek, in a depth of 6 fathoms, with the eastern extreme of Manda Toto bearing 118°, and the sandy point at the entrance of the creek 205°, keeping in mind the possibility of the extension of the mangrove points. There is good landing at the entrance of Kilindini Creek.

Tidal streams.—In the narrow part of the channel the tidal stream sometimes attains a rate of more than 4 knots, and even at neaps the rate is considerable.

Siyu Channel appears to have a least depth of 3 fathoms from Manda Bay to abreast of Siyu Creek; from thence toward Kwyhu Bay but little is known of it.

Patta Bay, separated from the entrance to Manda Bay by Mwamba Kwiyeye, is about 4 miles long in a northeast and opposite direction, and is both fronted and protected by Pazarli Ridge, which dries at low water, the entrance channels being at either end of this ridge. The shore of the bay is very low and bordered with flats and shallow water from 1 mile to 2 miles wide, making landing difficult at low water, but the bay is not often visited.

Kizingati Island, at the head of the bay on the flat fronting Patta Island, is 2 miles long in an east and west direction, its southern face presenting a remarkable feature, being fronted by a barrier of rocks slightly separated from the shore. Patta Cliffs, 2 miles eastward of Kizingati Island, and Patta Middle Cliffs between, resemble the southern coast of Kizingati.

Rocks and shoals.—The Pazarli Rocks have been already mentioned.

South Middle Bank lies in mid-channel of the South Pass, about 1 mile eastward of Pazarli Rocks; it is about ½ mile in extent, with a least known depth, near its western end, of 3 fathoms; the channel eastward of the bank is that usually taken.

Pazarli Ridge, its southwest end 2 miles eastward of Pazarli Rocks, is very narrow, and extends about 1¾ miles in a northeast direction, some of the rocks near each end uncovering at about 1½ hours after high water. From the southwestern portion of Pazarli Ridge a flat, with depths under 3 fathoms, projects about ¾ mile in a general north-northwest direction, and near its northern extreme is a 1-fathom knoll.

North Middle Bank is a 3½-fathom patch in about mid-channel between Pazarli Ridge and the southwestern end of Siwi Bank.

Siwi Bank and Reefs, fronting the coast between Patta and Kwyhu Bays, and, including Siwi Spit, extend over a space about 8 miles long in a northeast and opposite direction, by from 2 to 2½ miles wide, leaving Sylph Channel, a passage used by dhows, between it and the shore.

The northern part of the bank dries at low water, and shallow water extends in places a long mile outside the bank, especially Siwi

Spit, at its northeastern extreme. Sylph Rock, situated on the bank, abreast of, and about 2½ miles seaward from, Patta Cliffs, dries about 1½ hours before low water.

Entrances.—South Pass, the entrance between Mwamba Kwiyeye and the southwest end of Pazarli Ridge, is about 2 miles in width, but toward the eastern side of the pass is South Middle Bank, reducing the navigable width of the pass to about 600 yards between it and the southwest end of Pazarli Ridge.

There are depths of from 5½ to 6 fathoms in the pass.

North Pass, between the northeast end of Pazarli Ridge and the southwest end of Siwi Reef, is also about 2 miles in width, and has in mid-channel North Middle Bank.

The depths between Pazarli Ridge and North Middle Bank are reduced to 4½ fathoms by a bank in the center of the pass which has from 6½ to 7 fathoms around it.

Directions—South Pass.—From the southward steer for the northeastern Pazarli Rock, bearing 315°, until the east extreme of Kizingati Island bears 332°, which should lead midway between the southwest end of Pazarli Ridge and South Middle Bank, to an anchorage. There is a channel also westward of the South Middle Bank; all the channels are probably safest and easiest of access at low water.

North Pass.—Coming from the northward, Siwi Reef may be approached to a depth of 14 fathoms, keeping Kwyhu Peak bearing northward of 22° until the western extreme of Patta Cliffs bears northward of 310°, when steer 264° until the western extreme of Patta Cliffs bears 322°; steering on that bearing will pass about midway between the North Middle Bank and Pazarli Ridge, which latter is probably always visible.

When within Pazarli Ridge steer for the eastern cliffs of Kizingati Island until Ras Ukove, the eastern sand hill of Manda Island, is in line with Pazarli Rocks, bearing 230°, then steer about 240° to an anchorage.

Anchorage.—The anchorage, in a depth of 6 fathoms, should be near the line of Ras Ukove Hill in one with with Pazarli Rocks, bearing 230°.

Tides.—It is high water, full and change, in Patta Bay at 4 h. 30 m.; springs rise 10 feet.

Towns.—Patta or Pate, a town on the southwest end of Patta Island, being only approached through creeks and swamps, is almost deserted, and Siyu, the principal town, near the center of the island, with a population of about 5,000, is approached from Siyu Channel by a creek almost inaccessible to boats. Paza, or Faza, about 4 miles farther eastward, is also on a creek leading into Siyu Channel.

Kwyhu Bay, the inlet between Patta and Kwyhu Islands, is about 3 miles wide at its entrance, but a great part of it is obstructed by shoals; its continuation westward is Siyu Channel, which separates Patta Island from the mainland. In its northeastern part, where a river empties itself, is Fazy Harbor and Port Boteler.

Kwyhu Island, with its conical peak 155 feet high and other rounded hills and white sandy cliffs, is the most conspicuous part of this coast, and a good landmark for Kwyhu and Manda Bays when coming from the northward; Boteler Ledge, above water, forms its southwestern extreme.

Boteler Bank, about 1 mile in extent with about 2½ fathoms water, is nearly in the middle of the entrance to Kwyhu Bay, with a detached patch of 2 fathoms lying off its southwest side.

Kwyhu Knoll, with 5 fathoms water, lies about 3½ miles eastward of Kwyhu Peak.

Entrance channels.—The bay is entered by two channels, the southwestern being between Siwi Spit and Boteler Banks, while the northeastern, having two coral patches of 3 fathoms nearly in mid-channel, is between the latter bank and Boteler Ledge; this channel is not recommended for use.

The depths in the southwest channel are from 5 to 7 fathoms, avoiding the 2 fathoms detached patch.

Anchorage.—During the southwest monsoon the best temporary anchorage is the southwestern part of the Kwyhu Bay under the lee of Siwi Spit, entering by the southwest channel, and a good berth will be found in a depth of 6 fathoms over sand, with the east extreme of Fazy Island bearing 12°, and Siwi village 288°.

There is no recent information regarding Fazy Harbor or Port Boteler, both of which apparently afford good shelter for small craft.

Coast.—From Kwyhu Island to Birikau River, a distance of about 62 miles, the land presents an almost uniform range of low hills from 46 to 60 feet high, mostly of sand with a slight growth of scrub.

Juba (Dundas) Islands.—The coast trends in a general northeast direction and nearly in a straight line from Kwyhu Island to Juba or Dunda Islands, which latter are generally narrow, with their length parallel with the coast, from which they are rarely distant more than 2½ miles, and hence may be mistaken for the mainland.

The islands and rocks, which are above high water, amount to nearly 500, of which some measure from 2 to 5 miles in length, but the majority are small and barren, rising abruptly from, and overhanging a narrow line of reefs. They are for the most part connected by reefs, but have navigable passes here and there, leading to secure anchorages for small craft.

Caution.—Seaward of the islands a bank extends from 3 to 5 miles, with general depths of from 7 to 25 fathoms, but in places are coral patches of 3 fathoms and possibly less, situated 2 miles or even more outside the islands, which render a near approach to the coast dangerous for large vessels. Such vessels, if not requiring to visit any of the anchorages, will avoid all danger by keeping off the bank of soundings, and those bound to any of the islands or ports must be guided by the chart and a careful lookout.

Anchorages.—In the whole extent of this coast and of these islands there are but two anchorages of any importance, viz, Birikau River or Port Durnford and Kismayu or Refuge Bay.

Coast.—From Kwyhu Island the coast trends northeastward for 16 miles to Kiungamini Island, and at 7 miles is Simambaya Island, abreast which on the mainland, are the three Arletts Hills, somewhat conspicuous when skirting the edge of the reefs, but become completely hidden for a time by the central part of Simambaya Island.

Kiungamini Island is about 1½ miles in length, the maniland abreast appearing as two ranges of hills, moderately high and regular; rocks extend about 1,400 yards seaward from the southwest part of Kiungamini Island.

The village of Kiunga is on the mainland abreast of the northeast end of the island, and about 2 miles northeastward of it is another village, a short distance beyond which are said to be two black pillars, but neither the village nor the pillars are charted.

Anchorage may be obtained in a depth of 12 fathoms over coral and mud, abreast of the village, with the northeast extreme of the island bearing about 320°, distant 1¼ miles.

Dick's Head, about 7½ miles northeastward of Kiungamini Island, and about 1 mile beyond some low, flat, and bluff islets, is a low, rocky promontory slightly raised in the center, on the southern side of which rise there is a red sandy patch; the rocky face when seen from the eastward appears to have a narrow sandy cove in the center.

Dick's Knoll, a patch of 5 fathoms, lies 2½ miles southward of the northeast extreme of Dick's Head.

Castle Point, a bare islet having somewhat the appearance of a castle, has a landing place in a sandy cove on its southwestern side. Some white tombs are visible close to the beach on the mainland about 1 mile to the northward.

Another islet, 3½ miles northeastward of Castle Point, has also the appearance of a castle, and some islets, close northeastward of it, are low and flat, with bluff sides.

Dick's bank, nearly 1 mile in length in a direction parallel to the coast, and with 4½ fathoms water over it, is situated 3 miles east-northeastward of Castle Point.

Current.—In the vicinity of Castle Point or between it and Lamu the northeast and southwest-going currents generally meet during the northeast monsoon, and produce a current setting to the southeastward; the limits of the place of meeting, however, depend on the state of the monsoon and other circumstances.

Fair Point, 5 miles northeastward of Castle Point, is a bold round-topped rocky hill over a sandy beach, and, with the exception of Rozier Hill, forms the most conspicuous object between Dick's Head and Birikau River. Just southward of Fair Point are some white sandy patches which at times show well from seaward; and just northward of the point are some hummocky rocks, 100 feet high, near the beach; about ½ mile outside these rocks are Sherwood Reefs with less than 6 feet water.

Sherwood Point, 7½ miles northeastward of Castle Point, is low and rocky, with a hillock rising from a flat top; the point is not conspicuous from the offing. Two small islets lie near the outer edge of Sherwood Sand, which dries out 1 mile from the shore, about that distance northeastward from the point.

Sherwood Banks, about 2¼ miles east-southeastward of the southern islet on Sherwood Sand, are two shoals of 4 fathoms, and depths of from 5½ to 6 fathoms, known as Sherwood Sixes, extend nearly 1½ miles farther northeastward from these banks.

About 6 miles northeastward of Sherwood Sand is a hill on a projection of the land, with a ridge of cliffs below its summit, conspicuous when bearing about 310°.

Rozier Hill, about 11 miles northeastward of Sherwood Point, and ¾ mile inland, is the best distant mark on this part of the coast; it is flat-topped, bluff on its north and sloping on its south side, and showing above the coast range of hills. Rozier Peak, 1½ miles northeastward of the hill, is insignificant, but the locality may be identified by a huge haycock-shaped black rock standing between it and the beach, and off this part of the coast are Rozier Rocks.

Rozier Bank, 1¼ miles in length, parallel to and 2 miles from the shore abreast of the Rozier Rocks, has a depth of 3 fathoms over it.

Coast.—Between Rozier Hill and Budara Hill, or Mount Barreti, the coast becomes more barren, many sandy patches showing along the low coast range.

Budara Hill, 150 feet high, on the southern side of the entrance to Birikau River, when seen from the southward has a slight dip in its summit; Shimowongo Hill or Mount Gibbon, 215 feet in height, is the highest part of a small range about 3 miles within it.

Birikau River (Port Durnford), entered between a point ½ mile southeastward of Budara Hill and Kiembo (Foot) Point, 2⅓ miles apart, is reduced to about 200 yards in navigable width by shoals on either side, and extends for about 5½ miles, where it bifurcates at the mouths of the Birikau and Kimoti Rivers; it affords sheltered anchorage abreast Birikau village, but is only suitable for small vessels of about 13 feet draft.

The neighboring country seems capable of the highest cultivation, the soil varying from light red to a dark fine earth; the river banks are of coral with a narrow fringe of mangrove, within which the country is thickly covered with thorn bush, through which, however, it is possible with some difficulty to make way.

The Birikau River has been ascended for about 20 miles by a steam cutter during the dry season, and at any time it is navigable for that distance for vessels drawing up to 4 feet; no villages and only a few canoes were seen.

Dangers—West side.—Southeastward of the shore on the west side of the entrance, pinnacle rocks and sunken dangers, edged by reefs breaking heavily, known as Hood Reefs, extend 1½ miles from the shore and northeastward to within ½ mile of Kiembo Point, and on this reef about 1¼ miles southeastward of Budara Hill, is Needle Rock, 10 feet high, while at the northeast extreme Kete Kete or Hood Ledge, the northeasternmost and nearest rock to the channel, is 20 feet high.

Between a point southeastward of Budara Hill and Birikau village the shore is fronted by a coral reef, drying 6 feet, and extending 1,400 yards, on the northern part of which is Kuapisi (Joyce) Island, 30 feet high, and from the reef southeastward of this island shoal water under 3 fathoms extends to within 600 yards of Kete Kete Rocks, its edge forming the western side of the channel.

East side.—On the northeast side of the entrance, Yunda Point is 1¼ miles within Kiembo Point, and from the bay formed between a ledge with breakers beyond it, extends nearly 1 mile southwestward toward the channel; a rock 20 feet high lies off Kiembo Point, and Nott Rock, above water, is in the bay between that point and Yunda Point.

Beacons.—About 1¼ miles north-northeastward of Budara Hill, near a 42-foot hillock, is a pole surmounted by a white triangle on the largest and most conspicuous tree at the southeast end of a casuarina clump.

About 400 yards within Yunda Point are two iron beacons surmounted by white triangles about 25 feet above the river; they are 110 yards apart and in line bearing about 329°.

A beacon also stands about 400 yards northward of the creek at Birikau village on the west shore, but no reliance should be placed on finding the beacons in position as they are said to be indistinct and in a condition of decay.

Entrance—Depths.—The outer part of the entrance between the shoal off Kete Kete Rocks and the 20-foot rock off Kiembo Point is 900 yards in width, but immediately within this it is reduced to 200 yards, and to 150 yards or less when southwestward of Yunda Point; above this the channel has a width of rather more than 200 yards to the anchorage.

The depths are from 3¼ to 4 fathoms at the entrance, but close inside a patch of 3 fathoms lies in midchannel on the line of the leading mark; the channel deepens after this to 6 and 7 fathoms, and to from 6 to 9 fathoms at the anchorage.

Directions.—Coming from the southward Rozier and Budara Hills will be recognized, and the break in the coast line between the latter hill and Ras Burgal Peninsula is very conspicuous, while on a nearer approach the three coral Kete Kete Rocks will be seen, and the clump of casuarina trees with the beacon, also the flagstaff at Birikau village.

A dip in the Shimowongo Range, close to the summit, in line with the beacon in the casuarina tree, bearing 288°, should lead over the bar and the 3-fathom patch, and when the beacons near Yunda Point are in line, bearing 329°, they may be steered for, until the single beacon at Birikau village bears 309°, when alter course for it.

When the point southeastward of Budara Hill is in line with the east side of Kuapisi Island, bearing 194°, steer to pass about 200 yards off Kiweni Point and then in mid-channel to the anchorage. The edges of the reefs show distinctly when within Kuapisi Island.

Anchorages.—Port Foot, within Kiembo Point, on the northern side of the entrance, is a snug little anchorage for small vessels during the northeast monsoon. Temporary anchorage may be taken up outside the bar, but in that case steam should be always ready. The anchorage off the town is in a depth of 6 fathoms, with the flagstaff bearing about 216°.

Tides.—It is high water, full and change, in Birikau River at 4 h. 25 m.; springs rise 12 feet, neaps rise 9 feet.

Tidal streams.—The ingoing stream runs at a rate of 1½ knots and the outgoing stream at about 2 knots; an indraft toward the entrance is experienced with the former stream, and during the southwest monsoon there is usually a heavy swell and sea on the bar, especially with the latter stream.

Village.—Birikau, a small fishing village on the western shore, about 2 miles above the bar, may at some future time become a market for the cattle and agricultural produce of the Somalis occupying the plain, but at present it has a population of about 120, the population of the whole district being only about 2,000. The white flagstaff with topmast at the station is visible from the offing.

Communication with Lamu is by runner about 4 days, and with Kisimayu 3 days; also by occasional dhows.

Supplies.—A few sheep may sometimes be obtained here.

The water in the village wells is brackish, but it is stated that good drinking water has been found near the village.

Landing.—The best landing is just northward of the village.

Port Johnes, about 4 miles northeastward of Birikau River, on the northern side of Ras Burgal Peninsula, is entered between the islets of the northeastern end of that peninsula and Tandraa Island, the mainland at the back of the port being thickly wooded; it is a commodious harbor for coasting craft.

The depth in the entrance is 2½ fathoms, decreasing to 2 fathoms within the port, and the anchorage within, about 200 yards in extent, has a depth of 5 fathoms.

Burgal Shoal, of coral, lying about 1 mile eastward of Ras Burgal, in the approach to Port Johnes from the southward, has a least depth of about 2 fathoms over it.

Coast.—Tandraa Island, on the northeast side of Port Johnes, has a long sandy beach on its southeastern side, and about 3 miles northward of the island the coast range of hills suddenly drops into a plain which extends as far as Port Tula.

Darakas Island, about 6½ miles northeastward of Port Johnes, is hilly and higher at the northern than at the southern end; the eastern side of the southern hill is barren and sandy. Bluff Hill, formed by a dip in the coast range behind Darakas, is difficult to distinguish, but rising from the flat-topped range about 2 miles southward of Bluff Hill is a large square, flat-topped rock conspicuous from seaward.

Port Tula, about 13 miles northeastward of Birikau River, is entered between Vidal Ledge, a ridge of rocks about 1¾ miles in length in a north-northeast and opposite direction, and some islets southwestward of Tula Island, and within is more than 1 mile in extent. Tula Island has numerous sand hills along its whole extent.

The approach to Mto Umborini or Tula River, at the head of Port Tula, is shallow, with irregular depths. Within the river and in the vicinity of the entrance are a number of Portuguese ruins.

The depths in the entrance are from 4 to 10 fathoms, decreasing suddenly within to 3½ fathoms, and in the northwest part of the port to a few feet.

Anchorage.—The anchorage, northward of Vidal Ledge, is in a depth of 3 fathoms, over graved and sand, with the west extreme of Tula Island bearing 34°, and the small rock off the southern end of the Tula Islets 112°. There is also limited anchorage in about 2 fathoms off the village on the western side of Tula Island, to which place dhows resort for water on their way northward during the southwest monsoon. The tidal streams here are strong.

Port Shamba, about 10 miles northeastward of Port Tula, is formed by Tovai or Tuala Island, which lies nearly 3 miles from the mainland off the entrance to Tovai or Shamba River, and is entered on either side of Zigadi Island, which lies in the entrance; the passage on the northeast side of the island, although the most direct is shallow, and the sea breaks right across with even a moderate swell.

Tovai or Shamba River, at the head of the port, and having a number of ruins on its banks, is approached from the port over a bar, which nearly dries at low water, springs, but the river is deep when within; by the chart, there would appear to be a better passage to it from Port Thenina.

In the entrance to the Southwest Passage into the port a 3-fathom bank rises abruptly in mid-channel with depths of 6 and 7 fathoms on either side of it, and the Northeast Passage has only a depth of 1½ fathoms, but within there is not less than 4 fathoms to the anchorage.

Tovai or Tuala Island, about 5 miles in length, parallel to the coast, is high, with barren sand hills, the most conspicuous being near the southwestern end, where are several low rocky islets off a high sandy beach; about 1½ miles from the north end of the island is a white house, and just southward of it some ruins and a conspicuous streak of white sand.

A few rocky heads with 6 fathoms on them were found on the bank about 2¼ miles southeastward of the southwest end of Tovai; it is probable that other shallow spots may exist. The positions of the banks near the islands are generally indicated by the color of the water, and should always be avoided.

Port Thenina lies within Thenina Island, which is somewhat low, of a brown color, and immediately northeastward of Tovai Island, being joined to it by a bank, but no information exists as to the approaches to the port, though it would appear to be a harbor of considerable capacity.

Vuma (Little Kwayama) Island, about 4 miles long and 7 miles northeastward of Tovai, rises gradually to the center, where it is about 170 feet in height; several rocks and islets form a chain between Thenina Island and Vuma.

Kwayama Island, 2¾ miles north-northeastward of Vuma Island, is about 3 miles in length and much wider than most of these islands; the eastern side is skirted by a reef which continues round the islets close off its south extreme. A village is on its northwestern side, and a single white house on its eastern side is visible from some distance seaward when bearing westward of about 313°. This island being the northernmost of the large and prominent islands of the Juba group, may be a useful mark for identifying the position of a vessel.

Port Kwayama.—There is a passage on either side of Kwayama Island leading to anchorages; that to the southward, with from 4 to 6 fathoms, leading to Port Kwayama, lies between the island and Doubt Rock, ¾ mile south-southwestward, and on either side apparently of a 2½-fathom mid-channel patch. Doubt Rock is stated to be foul to a distance of 100 yards, and the channel to be only 300 yards wide.

Anchorage.—Within the pass is a spacious bay where vessels may anchor in depths of from 4 to 5 fathoms, southwestward of Kwayama Island, or westward of the rocky islets, extending from the northeastern point of Vuma.

Islets and reefs.—The islets and reefs between Kwayama Island and Kisimayu Bay are known as the Schmalcalder chain, the Humaul Rocks, and the Hawaween chain of rocks; they lie parallel with the shore, the two last-named being parallel to and abreast of each other. The shore is from 2 to 3 miles distant from the outer rocks, and shallow heads lie between them and the 100-fathom contour line, as they do farther southward; they should be given a wide berth.

Winds and currents.—The alternate monsoons are strong in the neighborhood of the Juba Islands and Kisimayu, and the currents run with them. From November to April, northeast winds prevail with a southwest-going current of about 2 knots, which is usually at its strongest in January and February.

A current with velocities of from 3½ to 4 knots in a 250° direction, was found setting continuously at 22 miles eastward of Kisimayu Island, between January 5 and 12, 1895, by the Eastern Telegraph vessel *Great Northern*, several buoys for the purpose having been moored in depths of from 600 to 800 fathoms.

From April to November the winds and current are reversed, the latter running from 2 to 3½ knots northeastward, or nearly parallel with the trend of the coast.

Kisimayu (Refuge) Bay, the northernmost anchorage on the east coast of Africa, which can be considered as a harbor, is better than any other to the northward of Manda Bay, and being accessible in all seasons, will always be valuable; it is contained between Blankett Point, on the southwest, and a point, off which is Kisimayu Island, on the northeast, a distance of about 6 miles.

The land about Kisimayu is undulating, but it and the hills of the same character, westward of Blankett Point, are by no means remarkable, while Round Hill, 230 feet high and 2¼ miles north-northwestward of Blankett Point, only appears round when bearing to the southward of 264°, and is at no time conspicuous; Wooded Peak, 4 miles northeastward of Round Hill, is 190 feet high, and appears more serrated than other hillocks, but haze often renders identification of the few landmarks difficult.

The land within the bay is dotted with mimosa and scrub, and near the beach, on the north side, are some white sand hills from 29 to 30 feet high, while westward of the northeast point of the bay is Kisimayu village and fort.

Islets—Mtanga Ya Papa.—Reef and shoal water extends about 2 miles southeastward and 2¼ miles northeastward of Blankett Point, having on its northeast edge and nearly 1½ miles from the point Mtanga Ya Papa, a flat-topped island about 800 yards in extent, 45 feet high, and covered with scrub. The island is difficult to distinguish in some lights, although with any haze over the mainland it shows out prominently; and Green Islet, 25 feet high, 400 yards northwestward of it is a useful mark.

Nyuni Islet, 25 feet high and dome shaped, with some rocks, is about 1⅓ miles to the southward of Mtanga Ya Papa, on the edge of the same shoal water. South Islet, of a similar height, and other rocks lie nearer the shore.

Fawatu Islet, 3 miles northeastward of Mtanga Ya Papa, is 13 feet high and is situated on the prolongation of a reef southwestward of Kisimayu Island; the reef terminates in a 1¼-fathom patch ½ mile southwestward of Fawatu Islet.

Pillar Rock, on which stands a cairn, is a rock resembling a sail 48 feet high and situated on the shore reef on the northwest side of the bay. It is an unmistakable mark, generally visible from some distance seaward.

Kisimayu Island, on the northeast portion of the same reef as Fawatu Islet, is 85 feet high with some low scrub on it, and appears of a reddish-yellow color compared with the land behind. A dome-shaped projection at its southwest end is joined by a low neck to the island and a small islet lies on a reef off its north end.

Mear Tomb.—A narrow, shoal, rocky ledge, breaking in places, extends in a northeast direction for 2 miles from Kisimayu Island to the south point of a reef which stretches nearly 1½ miles to the northward and has near its southern end Mear Tomb, a small islet 40 feet high, showing very green after rain, and having a dip in its center, which, when bearing about 218°, gives it the appearance of being double.

North Mear, about 300 yards to the northward of Mear Tomb Islet, is a bare, black-looking rock 28 feet high.

Reefs and dangers.—The approach to Kisimayu Bay is barred by a succession of outer reefs and shallow patches, while within the bay are numerous dangers, so that only the principal of these can be mentioned and the plan must be consulted for a full knowledge of them.

Owen Barrier, the outermost reef, is a narrow coral chain stretching parallel to the shore about 2½ miles outside a line connecting the points of entrance to the bay; its southwest end with 3¾ fathoms is nearly 1½ miles southeastward of Nyuni Rock, and Vulture Patch, of 2¾ fathoms, its northeast end, about 3¾ miles eastward of Kisimayu Island, the least depth on the reef between being 2¾ fathoms.

Dædalus Knoll of 2¼ fathoms and Vulture Patch of 2¾ fathoms, although considered as the continuation of Owen Barrier, northeastward of Middle Reef, are separated from Owen Barrier by Zigzag Pass, and there are other openings through the barrier, but as there is always a heavy swell they could not be used by even the smallest vessel without risk unless the leading marks could be seen.

Middle Reef, ¾ mile inside Owen Barrier, is nearly 2¼ miles in length in a northeast and opposite direction under a depth of 3 fathoms and has some spots on it of less than 1 fathom; it breaks heavily, and southwestward of it the bottom is uneven and rocky, terminating in Blankett Knoll, with a depth of 3 fathoms, which is 1 mile southwestward of the southwest end of Middle Reef.

Fred Rock, with less than 1 fathom over it, lying in the center of the bay, is 1 mile offshore; and in addition to the shoal water extending nearly 2 miles northeastward of Blankett Point, a bank with 1 fathom at its extreme and foul ground, extends fully 1 mile southeastward of the white sand hills on the northwest side of the bay.

Beacons.—A column 20 feet high stands on Mark Hill, about 800 yards west-northwestward of Pillar Rock.

A white beacon stands on the edge of the shoal water nearly ½ mile east-southeastward of the preceding.

Fawatu Islet is marked by a white pillar.

Two black and white horizontally striped beacons, situated about ½ mile east-southeastward of Kisimayu Fort, are in line bearing 31°.

Passes.—The four principal passes into Kisimayu Bay are Fawn Pass, Knott Pass, Zigzag Pass, and North Channel, and Inner Pass within them, and of these Fawn Pass is recommended for use by vessels from the southward and North Channel for those from the northward; when entering by them it should be remembered that the direction of the current in either monsoon will be on the beam, and a sailing vessel should be kept well to windward, so as to maintain the line of the leading marks until within the Inner Pass.

Fawn Pass—Depths.—The least depth in Fawn Pass over Owen Barrier is 5½ fathoms, but within, the line of the leading mark leads over a 5-fathom patch, about ½ mile northward of the northeast end of Middle Reef; not less than that depth will be found through Inner Pass into the bay.

Directions.—The fort at Kisimayu, known by its yellowish color, and having a square red flag hoisted at its flagstaff, in line with the low neck at the southwest end of Kisimayu Island, bearing 338°, leads through the pass, but several houses having been built near the fort, it may not be easily recognized, and the residency, a white building also with a flagstaff, coming in line almost on the same bearing, it may be mistaken for it, both flagstaffs being nearly in line when in the pass.

The leading mark, which must be adhered to closely, any deviation on either side being known by shutting in the fort, should, if possible, be brought on at some distance outside the Owen Barrier, so as to observe the set of the current before crossing it, bearing in mind that it is frequently as strong inside the barrier as outside.

If the current is too strong to keep on the leading mark in passing Middle Reef, when over the barrier, which will be known by the soundings, keep to the northeastward until on the leading mark for Knott Pass, which follows.

When the cairn on Pillar Rock is in line with the white pillar on Fawatu Islet, bearing 299°, alter course to 280°, for the entrance to the Inner Pass, observing that North Mear Rock should be kept open eastward of Kisimayu Island bearing 39°, until Pillar Rock Cairn and the white beacon are in line 324°, which leads through the Inner Pass, and when the two black and white beacons, near Kisimayu, are in line bearing 31°, they will lead along the northwest side of the shoal extending southwestward from Kisimayu Island to the anchorage off the village.

If intending to proceed to the anchorage in the southwest part of the bay, and being on the leading mark through Inner Pass, when the west extreme of Green Island bears 216°, steer for it, and Smyth Islet, the northernmost and nearest of four islets on the bank to the southward of Blankett Point, should be seen in line with the west side of Green Island, which mark leads southeastward of Fred Rock; when Nyuni Islet is open twice its own width eastward of Mtanga Ya Papa, bearing 187°, steer 266° for the anchorage.

Knott Pass—Depths.—Knott Pass, about 1 mile northeastward of Fawn Pass, is a safe channel, its depth giving more room for a deviation from the direct track, but the leading marks are not so good from outside Owen Barrier as for Fawn Pass.

The least depth in Knott Pass is 5 fathoms.

Directions.—To enter by Knott Pass, bring the column on Mark Hill in line with the cairn on Pillar Rock, bearing 298°, and steer for it, when Pillar Rock should be open 2° to the southward of Fawatu, and when Kisimayu Fort is well open of the southwest end of Kisimayu Island, bearing 343°, alter course to 253° for the entrance to Inner Pass, and follow the directions already given.

Zigzag Pass—Depths.—Zigzag Pass, the great natural entrance, having no leading marks, can not be used, its proximity to Dædalus Knoll making good marks a necessity.

The depths in the fairway of the pass are from 9 to 13 fathoms.

North Channel.—A vessel coming from the northward may find the lighthouse at Giumbo of service, and at the mouth of the Mto Ya Vumbu is a rounded bluff with denser bush on it than elsewhere, which is a mark, but not a good one. Murder Hill, 150 feet high, midway between Mto Ya Vumbu and Kisimayu, is a small conical hill, not higher than the adjoining plateau, but separated from it on either side by a distinct dip; it is remarkable from its shape, and is best seen when bearing about 309°.

North Channel, leading round the northern end of Owen Barrier, is the nearest entry from the northward, and with a heavy sea, much wind, and a strong current, is the best pass for a large vessel, as the water is deep and there is abundance of room.

Depths.—The depths in the channel are from 10 to 14 fathoms.

Directions.—To enter by the North Channel, bring Mear Tomb Islet to bear 266° and steer for it until Round Hill is in line with the north extreme of Kisimayu Island 247°, which mark, leading straight in from seaward if coming from the northward, should be kept on until Mear Tomb Islet bears about 300°; then alter course to 220° until the fort opens of the southwest end of Kisimayu Island, 343°, when steer 253° for the Inner Pass mark, and proceed as directed for the Fawn Pass.

Anchorages.—The anchorage off the village is in a depth of 3½ fathoms over sand and mud, with the southwest extreme of Kisimayu Island bearing 129°, and Kisimayu Fort 9°.

In the southwest part of the bay the anchorage is in a depth of 3¾ fathoms, over sand, with the north extremes of Mtanga Ya Papa and Green Island in line bearing 128°, and a piece of rocky cliff, westward of Blankett Point, 210°.

Tides.—It is high water, full and change, in Kisimayu Bay at 4 h. 0 m.; springs rise 10 feet, neaps rise 6 feet. The tides are variable and probably considerably affected by the winds and currents.

Town.—Kisimayu, the residence of an acting provincial commissioner, consists of a collection of native huts and shops, surrounded by barbed wire and situated close to the beach; it has a mixed population of about 4,000.

Pier.—An iron openwork pier, 325 feet in length, extends from the shore nearly ½ mile southwestward of Kisimayu Fort, with which it is connected by a trolley rail; a derrick at its outer end will lift about ½ ton.

Communication with other coast ports is maintained by the coasting vessels of Messrs. Cowasji Dinshaw Bros. and by dhows.

Supplies.—Beef and mutton are plentiful and cheap at Kisimayu, but vegetables and fruit are scarce, and the water of poor quality. Fish may be obtained with the seine on the beach fronting the village.

Landing may be effected in any part of the bay during the northeast monsoon; during the southwest monsoon the best place is on a sandy point northward of Kisimayu Island, but, even at high water, it is sometimes dangerous.

Trade.—The exports are hides, maize, and cotton, and the imports manufactured goods, especially cotton. A small trade passes through, but the actual trading place for this part of the coast is at the mouth of the Mto Ya Vumbu, where there is a much larger settlement, of which Kisimayu is, to some extent, the port, in consequence of the dangerous bar of the Mto Ya Vumbu.

Climate.—Fevers are said to be unknown at Kisimayu. In the immediate vicinity of the bay there is a great dearth of vegetation which probably contributes to its salubrity, although at the Mto Ya Vumbu, where the land is rich and vegetation abundant, fever is also scarcely known.

During the northeast monsoon the climate is far preferable to that of Zanzibar, the nights being almost cool and the air at all times dry. The maximum temperature in October is about 82°.

CHAPTER XII.

MTO YA VUMBU TO RAS HAFUN.

Mto Ya Vumbu (Juba River) is locally known as Webbe Ganana, its mouth being situated about 9 miles northeastward of Kisimayu Bay; the river rises in the southern Abyssinian Mountains, flows southward to Dolo, where it receives the Daua from the westward and continues from that its southern course to the sea, a distance of about 300 miles in a straight line.

Light.—At Giumbo, on the north bank of the river, is a white framework structure, which exhibits, at an elevation of 121 feet above high water, a group flashing white light, visible 16 miles.

Beacons.—A four-side white pyramidal beacon stands on a hill, 243 feet high, about 2 miles to the northward of the river entrance.

A black and white horizontally striped triangular beacon is situated on the sandy peninsula between the new and old mouths of the river, and a similar beacon stands to the northward of and close to the lighthouse, the first two beacons in transit and the third beacon in line with the wireless mast, being the marks for anchoring.

Radio station.—The radio station at Giumbo is open to the public from sunrise to sunset, the call letters being I. S. D.; and another station is at Bardera, near the rapids, open for a similar period, the call letters being I. S. N.

Landmarks.—In addition to the lighthouse the wireless station and the beacons are all conspicuous objects, while the town of Giumbo has two large white buildings, and the Government House, or Residency, a white building with a square white watchtower, about ¼ mile north-northeastward of it. This tower, standing on dunes near the coast, is visible from 15 to 16 miles in clear weather, and another white watchtower is situated to the eastward of the town.

Bar—Depths.—The former entrance to the river is closed by a sand bank, about 20 feet high, and a new mouth has opened about 1 mile southwestward of the former. The bar is doubtless sometimes dangerous and impracticable.

In 1910 the depth on the bar was estimated to be about 1½ feet at low water.

Anchorage.—The anchorage off the entrance, probably in depths of from 5 to 6 fathoms, over sand, with good holding ground, is with the white beacon on the 243-foot hill in line with the black and white triangular beacon on the sandy peninsula between the new and old mouths, and the wireless mast in line with the black and white beacon near the lighthouse; the sea is often heavy at the anchorage.

Tides.—It is high water, full and change, at the Mto Ya Vumbu about 4 h. 30 m.; springs rise from 9½ feet.

Giumbo, formerly known as Juba or Vumbu, standing on a moderately high hill, about 3 miles within the entrance, is somewhat large, and is the center of trade in this district, but, owing to the river bar, Kisimayu is usually the port of shipment. The large village of Yonte, about 13 miles above Giumbo, has several good European houses in it.

Upper river.—In July, 1892, the Mto Ya Vumbu was ascended by Commander F. G. Dundas of the British Navy, in the British East Africa Co.'s steamer *Kenia*, 86 feet long, 23 feet beam, and 2½ feet draft, as far as the rapids about 20 miles above Bardera and about 407 miles from its mouth, and the following is a summary of his remarks:

> Above Giumbo, which was left on July 23, depths of 2½ to 3½ fathoms were carried for about 8 miles, or nearly to the large villages of Hajowen and Hajualla, since destroyed. The country consisted of large grass plains, with occasional woods, and game was exceedingly plentiful, but the river was very tortuous, doubling back on itself in places, and snags were numerous.

Below Mataku, which is situated about 10 miles northward of the Equator, the river forked and expanded to a width of about 120 yards, but narrowed to from 15 to 20 yards wide in places near Mataku, with dense foliage; the river reunited some miles above this.

At Fuleile, the chief of the Gusha district resides, and the Swahili language is spoken; from this to Bilo, 100 miles above the entrance, there are numerous densely populated villiages, the banks were cultivated, and large groves of bananas, etc., were constantly met with.

A few miles above Bilo a branch extended to the southwestward, which was explored for about 20 miles; it had depths of about 3 fathoms, a 3-knot stream, and the trees overhung in many places, so that the vessel was turned only with considerable difficulty.

Returning to the main branch, there was dense impenetrable forest on either side, which continued for about 5 days, without any sign of human life, when, on August 2, the village of Kabote was reached; here the river rose 18 inches in one night.

Above Anole the character of the banks entirely changed, becoming hard and stony, with a plateau 200 feet in height extending on either side. Three rocky bluffs, 150 feet high, rise abruptly from the river just before arriving at the large Somali village of Munsur.

Bardera, reached on August 10, was a town of about 1,200 inhabitants, the people living chiefly on their flocks and herds, there being but little cultivation around it. The great caravan route from the Boran country crosses the Mto Ya Vumbu here; by it are brought ivory and hides, which find their way to Brawa and other northern ports.

Logh, another large town, is 5 days' journey from Bardera.

Rapids.—After leaving Bardera the river was falling rapidly, and when past the village of Manda it ran between rocky hills from 300 to 400 feet high; at the rapids the bed of the river was found to be a mass of rocks, the depth varying between 6 inches and 3 feet, and the stream running 6 knots.

It is stated that at 4 hours' journey above the rapids the river falls over a ledge of rocks, so that a vessel ascending the rapids at high river would be stopped by the falls. The vessel returned to Giumbo on September 20, the journey downstream from Bardera occupying 35 days.

Fluctuations.—The river commences to rise in February, and is in flood in March, but in April the water begins to fall, and from May to July, inclusive, there is very little water, although the river is rising gradually. A second and greater rise follows this, the river being in flood from August to October, inclusive, rising and falling every 10 days from 8 to 12 feet, but in November the water falls rapidly and the river is low in December and January.

Navigability.—When the river is in flood the known head of navigation is at Anole, about 350 miles from the mouth, but sometimes launches go beyond this to the rapids at Bardera, navigation being possible from May to December. The navigable river width varies from 100 to 250 yards, the river flowing between well-defined banks, overgrown with forest and jungle, except where cultivated; numerous and sharp bends necessitate careful navigation.

The river is navigable for small steam vessels all the year round to Yonti, a military cantonment about 14 miles from the mouth, and during floods they reach Serenleh, a British military post. There are no bridges, but fording places in the dry season, and canoe ferries at villages; the river abounds with crocodiles and the banks with big game.

Health.—Not a single case of fever occurred. This is attributed to the dry heat and to the fact that the river does not overflow its banks and cause malarial swamps like the Tana, etc. Mosquitoes also were fortunately rare. The average temperature was 90° F. in the shade during the day and 83° at night.

Supplies.—Game was abundant, and bananas, etc., were obtainable at most of the villages. No firewood was cut, there being numbers of dead trees to be had along the banks, thus saving considerable labor.

Produce.—On the whole west bank of the river is a belt of what is known as "black cotton soil," which has already produced crops of cotton equal to the finest Egyptian.

Coast.—From the Mto Ya Vumbu northeastward to and beyond Ras Hafun, the country is within the Italian sphere of influence, and that portion, nearly 290 miles long, between the Mto Ya Vumbu and Murot Hill, just to the southward of Athelet or Itala, is known as the Benadir coast, from its containing the four so-called ports of Brawa, Merka, Mogadiscio, and Warsheik; the word "benadir" being simply the plural of bandar, and signifying ports.

From the Mto Ya Vumbu the coast, trending northeastward in a nearly straight line for about 115 miles to Brawa, consists chiefly of reddish sand downs, covered here and there with stunted bush, and backed by high sand hills, most of which are bare and visible from a distance of about 25 miles. A high surf beats against the ledges which in most parts front the shore.

Between Mto Ya Vumbu and the red sand hills, about 40 miles to the northeastward, the depths are said to be only from 6 to 7 fathoms at 2 miles from the shore, and about 75 miles northeastward of Mto Ya Vumbu anchorage has been obtained in 16 fathoms, within ½ mile of a coral reef estimated to be from 1½ to 2 miles from the shore; this places the reef between Bur Gira and Cascara (Gaschera). In places the coast may be approached with safety to depths of from 9 to 10 fathoms, which will be found about 1 mile off.

In the vicinity of Oboie, about 10 miles northeastward of Cascara, is said to be one of the best landmarks on this coast, its local name being Sabda Badda; it consists of a saddle about 1 mile long, with two conical-shaped hills at each end and a black rock near the shore, about midway, and 3 or 4 miles northeastward of Sabda Badda are several conspicuous dark-red patches on the coast hills.

Large herds of cattle may be seen from seaward along this coast.

Doho or Haines River (Webbe Shebali), the course of which is charted nearly parallel to and about 120 miles eastward of the Mto Ya Vumbu, on nearing the coast bends to the southwestward, parallel to it, passing inland of Brawa, Merka, and Mogadiscio, and discharging into Deshek Wama, a marshy lake, dry except in the rainy season, and apparently connected with the Mto Ya Vumbu.

Brawa.—Kisiwa Mnara, an islet 33 feet high, having on its summit a tower 26 feet high, and situated off a point about 1½ miles southwestward of Brawa, shows out well against a white hill behind it, forming a good mark, visible 10 miles under favorable circumstances, and from the point near the islet, the coast trending northeastward, is sandy open country, rising gradually to summits of sand hills from 260 to 390 feet high, having a reddish appearance, spotted with dark clumps of brushwood; northward of the town is another and higher bare white hill.

The shore between Kisiwa Mnara and the town is fringed by reefs, having on them the Iboriadoro and Makinissi (Marghinisi) Islets, all small, and the latter from 20 to 30 feet high; farther northeastward is Mafagga (Mafaca) Rock, lying on a small detached reef, and other small reefs curve round from it, forming the north side of the Inner anchorage. Kila Islets (Scillani), protecting the east side of the Inner anchorage, are from 30 to 36 feet high, and stand on a reef about 1,200 yards long in a northeast and opposite direction.

Light.—On the northeast Kila Islet is a square tower, surmounted by a lantern, which exhibits, at an elevation of 92 feet above high water, a group flashing white light, visible 15 miles.

Beacons.—A pyramidal beacon surmounted by a pole stands on the southern of the Kila Islets.

About 1 mile northwestward of the town and fronting a remarkable sand hill 49 feet high is a black and white checkered rectangular beacon, 34 feet in height.

Nearly ⅔ mile to the northward of the residency and 121°, distant 1,500 yards from the preceding, is a masonry pyramid with black and white horizontal bands. The beacons in line, bearing 301°, lead to the southwest monsoon anchorage.

A dark-colored beacon is situated near the customhouse at the south end of the town, and on Mafagga Rock there is a small pillar.

Radio station.—The radio station, situated near the southwest angle of the town, is open to the public from sunrise to sunset, the call letters being I. S. C.

Dangers.—Mamba Karani (Elba Shoal), about 400 yards in extent within the 5-fathom contour line, and having a least depth of 1½ fathoms, lies about 1,600 yards northeastward of Kila Islet Lighthouse.

A rock with 2½ fathoms over it lies 21°, distant about 950 yards from Kila Islet Lighthouse.

Anchorages.—The bank of soundings off Brawa is distinctly marked by the change in the color of the water, the deep ocean blue changing suddenly to green, and farther inshore to dirty yellow.

The anchorage in the northeast monsoon is in depths of from 6 to 12 fathoms, nearly on the line of the beacon near the customhouse in line with Mafagga Rock, bearing 337°, a good berth being with Kila Islet Lighthouse bearing 14°, and Kisiwa Mnara Tower 243°, or a vessel may anchor about ½ mile southwestward of that tower with better shelter.

In the southwest monsoon the anchorage in about 5 fathoms is nearly within the beacons in line bearing 301°, with the lighthouse bearing about 226°.

Small vessels can anchor in about 3¾ fathoms in the inner anchorage, with the lighthouse bearing about 70°, distant about ¼ mile, and protected except from the southward.

Tides.—It is high water, full and change, at Brawa at 4h. 14m.; springs rise 7½ feet, neaps rise 5¼ feet.

Current.—The current in the road, following the direction of the coast, is either northeast or southwest going, according to the monsoon, with varying strength. The northeasterly set is least felt at low water and is at its maximum at high water, sometimes running from 3 to 4 knots.

Caution.—During a calm in the month of December, when about 22 miles northeastward of Brawa, a set of 36 miles in a direction almost 270°, or nearly direct on the land has been reported, this being apparently a surface current, and as the vessel neared the shore the set of the current became more southgoing.

Town.—Brawa is a walled town built on an eminence about 100 feet high, with stone houses near the water and huts behind; the residency, usually hoisting the Italian flag, is near the beach about the center of the town, and the customhouse at its southern end.

Extensive harbor works are in progress.

Supplies of cattle and sheep are plentiful and other articles may be obtained in small quantities, while camels for transport could be hired on giving notice. Water of good quality is procurable in fair quantity, the best place for watering being about 400 yards to the northward of Kisiwa Mnara Tower; this water, although slightly brackish, is fit for use. A road along the coast to the northeastward, connecting it with other ports on the Benadir Coast, has wells at from 6 to 10 miles apart.

Landing is generally difficult, but it may be effected during the northeast monsoon; in the southwest monsoon, it is still more difficult.

Trade.—The exports consist of hides, orchilla weed, sesame, gum, ghi, and earthen pots.

Climate.—The climate is reported to be healthful.

Coast.—From Brawa the coast, trending northeastward about 96 miles to Mogadiscio, is generally sterile, sandy, and destitute of trees, with a few rocks near the shore in some places, and bold of approach to a distance of 1 mile. Merka is nearly 60 miles northeastward of Brawa, and from Ras Dai, about 8 miles from the latter place, the coast hills are overgrown with stunted bush, but toward Merka they resume their usual sterile appearance; a road from Brawa follows the coast to Merka, and numerous strings of camels and herds of cattle are sometimes seen on it.

Midway between Brawa and Ras Dai is Mamba Gaschera, a reef lying about 1 mile offshore, with rocks awash on it, which show by breakers.

Ras Dai, nearly 8 miles northeastward of Brawa, projects about ½ mile to the southeastward, a reef extending about 100 yards northeast of it terminating in a rock 3 feet high. On the north side of the ras is a bay about ½ mile in width, affording good anchorage for small vessels during the southwest monsoon, at which time there is no surf on the beach rendering it conspicuous, but the point affords no protection in landing. The depth in the bay is about 10 feet.

Anchorage in a depth of 8 fathoms, over fine dark sand, may be obtained apparently about 1½ miles off Ras Dai, but this coast, on which are several villages, should not be approached within a depth of 20 fathoms.

Water may be obtained from a well near the beach of the bay northward of Ras Dai, but it is brackish.

Coast.—Ras Sindassi, situated about 21 miles northeastward of Brawa, is rocky and distinguishable by a large white sand patch; Ras Siama, between Ras Dai and Ras Sindassi, is also rocky, and has a smaller white sand patch than that near the latter point, but owing to being partially hidden by trees this patch is less conspicuous.

About 6 miles farther in the same direction is Torre, a compact, moderate-sized collection of huts surrounded by a wall on the land side, and near the coast on a sloping headland, between a widely extended patch of red sand to the northward, and a smaller patch of white sand to the southward; the locality may be further known by a hill of red sand and brushwood to the southward, by a long patch of black rocks on the beach about 30 feet high, also by a remarkable horseshoe shaped gap at the northern end of the town.

There is a depth of 8 fathoms at ½ mile off the point of the headland, and southwestward of the point is a detached dry rock; probably there is a fair landing here in the northeast monsoon.

Munguia, a straggling village of huts about 16 miles northeastward of Torre, would not be seen from a vessel unless close in; the shore between these places is mostly fronted by a detached reef, inside of which the water is smooth but apparently shallow.

Merka.—Agare Point, on which is Agare mosque, showing clearly through the trees and having a white minaret, is situated about 12 miles northeastward of Monguia, and between it and a point 2 miles northeastward is the roadstead of Merka; about ½ mile within this shore the land rises to white sandhills from 260 to 330 feet high, a red-topped dune at their northeast end being named Grand Rabai, at the foot of which are tombs, partly in ruins, and having minaret-like cupolas. On the dunes is a white watchtower.

Other landmarks are Seech Osman Mosque, standing alone near the customhouse, which is in a small bay to the westward of the town, and the Banian Well, surrounded by a wall above which a solitary tree rises; Osman Gor Mosque, on the shore, about 1 mile southwestward, is, owing to its dark walls, an inconspicuous ruin, but it still affords a good mark for the anchorage, while on a hill, about 330 feet high, behind the town is a white house having a tower without windows.

The whole shore is fronted by reefs and shoal water extending about ½ mile, while outside this and eastward of the northeast point are patches of 3¼ fathoms as much as 1,400 yards.

Leading lights.—Two leading lights, about 200 yards apart, and in line bearing 345°, are situated to the westward of the town.

The rear light, occulting white, is exhibited at an elevation of 116 feet above high water from the northwest angle of the town wall, and is visible 12 miles.

The front light is fixed white, and exhibited at an elevation of 26 feet above high water from the minaret of Osman Mosque; it is visible 8 miles. For bearings obscured, see Light List.

Radio station.—The radio station at Merka is open to the public from sunrise to sunset, the call letters being I. S. B.

Anchorage.—The anchorage outside the bank fronting the shore is quite exposed, and, owing to the steepness of the bank, much contracted in space; it is said to be one of the worst on this coast. In the southwest monsoon the best anchorage is in a depth of 12 fathoms, with the fort in line with the Banian Well inclosure, bearing about 356°.

In the northeast monsoon large vessels may anchor in a depth of 15 fathoms, over sand and coral, with the town bearing about 300°, distant 1 mile, but a better anchorage is in 11 fathoms, with the gate of the fort in line with Seech Osman Mosque bearing 345°, or by night the leading lights in line on the same bearing.

An inner anchorage, in a break in the bank in depths of from 3 to 4 fathoms, may be used by vessels of light draft in the month of November, when the monsoon changes and northeast winds prevail, the reef, which partly dries, affording protection from that direction.

Tides.—It is high water, full and change, at Merka at 4 h. 0 m.; springs rise 8 feet.

Currents.—The currents off Merka are similar to those given in the description of Brawa.

Town.—The town of Merka, built on a small coral peninsula, is surrounded by a wall having on it several watchtowers, and is of more imposing appearance from seaward than either Brawa or

Mogadiscio; near its southern part is the residency, a large square building with a flagstaff. The houses are mostly built of stone, and some are of considerable size, while the native huts are surrounded by a small compound; the streets are narrow but clean.

Supplies of cattle and sheep are plentiful, and fowls, eggs, and water can be obtained, but the latter is in limited quantity, of doubtful quality, and slightly brackish. Camels for transport purposes can also be procured if required.

Landing is frequently impracticable at high water, and communication with the shore is generally difficult.

Coast.—Gilib, about 6 miles northeastward of Merka, is a large village standing on a cliff, and having in its center a conspicuous single palm tree; between Merka and Gilib the irregular outline of the sand hills is visible from a distance of about 15 miles, and it is said that the coast between Merka and Mogadiscio is safe to approach to a distance of 3 miles.

Gonderscia and Coriale, two conspicuous villages, are situated, respectively, 5 and 6 miles northeastward of Gilib; Gonderscia consists of stone houses and round huts made of mats or skins, while Coriale is surrounded by a small grove of coconut palms. A solitary mosque, or tomb, is situated between the villages, and there is the ruins of another on the cliffs.

Ras Kaf, a conspicuous cleft promontory, southward of Danani, about 20 miles east-northeastward of Merka, is fronted by a coral reef in which are several openings, and Jacober Village is situated on the coast, about 1 mile southwestward of the point.

Anchorage in a depth of 13 fathoms with good holding ground is reported at about ½ mile south-southeastward of Danani.

Coast—Water.—Midway between Danani Point and Mogadiscio is a broad road, or path, running at right angles to the coast, and noticeable from a distance of 5 or 6 miles seaward; it leads to a number of wells situated about 3 miles from Danani Point, the water from these wells being noted for its purity.

Mogadiscio (Mogdishu).—From Danani the coast has a gen- east-northeast trend for about 20 miles to Mogadiscio, which place may be seen from a considerable distance, when approached from either direction, as it stands about 40 feet above a sandy plain; Forte Cecchi, standing ½ mile west-northwestward of the town, is square, surrounded by a vertically striped black and white wall, and has a black and white checkered square tower, about 40 feet higher than the wall.

Mnara Tower, isolated on the beach eastward of the town, is of considerable height, and of a dark color, rendering it conspicuous agaist the white sandy background, especially on a clear night: both the above landmarks can be seen from a considerable distance seaward. Several new buildings near the shore have red roofs and are fairly conspicuous.

A reef, which always breaks, fronts the shore eastward of the town for a distance of 1½ miles, extending off about 800 yards.

Lights.—From a structure on a ridge northwestward of the town a flashing white light, visible 20 miles, is exhibited, at an elevation of 246 feet above high water, but in 1913 it was reported to be only visible 9 miles.

Eastward of the eastern part of the town, an occulting red light, visible 5 miles, is exhibited at an elevation of 66 feet above high water.

Beacons.—The black and white checkered tower in Forte Cecchi is surmounted by a pyramid with black and white horizontal bands, over which is a beacon with a black ball.

Betel Ras, a large building, is surmounted by a conspicuous tower with black and white bands, which is used as a beacon.

There are beacons on Ras Sif, ⅔ mile southwestward and also close eastward of Amaruni, and a beacon stands on a sand hill about ½ mile northeastward of Mnara Tower.

Radio station.—The radio station situated about ⅓ mile northeastward of the town is open to the public from sunrise to sunset, the call letters being I S E, the masts of the station are conspicuous from seaward.

Anchorages.—The anchorage in a depth of about 6 fathoms is immediately northeastward of the beacon on Forte Cecchi in line with the beacon on Betel Ras, bearing 307°, or a vessel might anchor farther out in 13 fathoms, with the southwest part of the town bearing about 300°, but the anchorage is open and exposed.

A small basin, with depths of from 1¼ to 2¾ fathoms, is situated in the reef, fronting the shore, eastward of the town, and is approached through a narrow and shallow passage; it affords anchorage for small vessels and dhows.

Tides.—It is high water, full and change, at 4h. 19m.; springs rise 7¾ feet, neaps rise 5½ feet.

Town.—The town is divided into two distinct parts, the southwestern, named Amaruini or Hamerween, being the older; it was originally a Portuguese settlement, and has a number of stone houses. Cingani or Shangani, the more modern and northeastern portion, is the residence of the governor, the residency hoisting the Italian flag, being near its southwest angle. Mogadiscio is the most important town on the Benadir coast; the customhouse is situated on the eastern side of Amaruini.

Supplies.—Fresh beef, sheep, goats, fowls, eggs, milk, etc., are plentiful, but water, obtained from wells near Mnara Tower and brought off in tubs, is scarce. Camels can be either bought or hired here for transport purposes; there is an abundance of game in the neighborhood, especially guinea fowl, bustard, gazelle, and wild boar.

Landing.—The general landing place for boats is near the customhouse recently built on the eastern side of Amaruini, but during the northeast monsoon, either near high or low water, it is only effected with difficulty.

There is good landing at the head of the dhow harbor, near Mnara Tower, at all times of tide during the northeast monsoon, but in the southwest monsoon the entrance may be dangerous for boats, and during that season it is said that landing can only be effected about once in four days.

Trade.—Most of the Arab dhows visit this place in their coast navigation to exchange sugar, molasses, dates, salt fish, and arms for ivory, hides, gums, and homespun cloth; an import trade in American cottons is also growing up. November to April are the trading months, being the fine weather period.

Current.—The southwest-going current, commencing off Mogadiscio, almost invariably with bad weather from the northeast, about the second week in December, sets in the same direction, at a distance from the land, for nearly a month earlier; its duration is about three months.

Off Mogadiscio in August the current has been found to set northeastward with a velocity of about 3 knots, nearly parallel with but inclining toward the shore, and in that month a current setting 82 miles in a direction about 45°, has been recorded. Both German and Italian surveyors apparently agree that the northeast-going current attains its greatest velocity between Brawa and Warsheik, a rate of 5¾ knots having been experienced in that locality.

Off the Benadir, in the open sea, the currents follow the well-known laws during the two monsoons, but inshore, up to an average distance of 1 mile offshore, the waters are either stationary or are affected by light varying currents depending on the tides or on the conformation of the coast itself. The point at which the open sea current begins is often indicated by a line of ripplings or small breakers, sometimes producing the effect of being near a bank.

The winds and currents being so variable in strength and direction it is a doubtful experiment to try to get to the southward by standing offshore, but a steam vessel of moderate power should be able to do so by following the coast closely by day and by anchoring at night, but this requires the most unremitting attention.

Coast.—About 12 miles northward of Mogadiscio a chain of hills commences and extends some miles to the northeastward, and in this locality there are two or three bays with white sand hills, the coast in general being sandy, sterile, and somewhat low; the depths decrease suddenly from 40 fathoms to 10, 5, and 3 fathoms, and a wide berth should be given to this coast.

About 15 miles northeastward of Mogadiscio the commencement of a line of reefs extending about 24 miles parallel to and distant 4 or 5 miles from the shore is charted, but the existence of these reefs has been questioned; the coast is generally low, sandy desert, with hills behind of a reddish color, with scanty vegetation, and fronted by a line of black rocks.

Warsheik, about 31 miles northeastward of Mogadiscio, stands on a rocky mass, the land rising sharply, and visible from a distance of 12 miles in clear weather. From Ruin Point at the south end of the town a ledge of rocks awash extends about 400 yards southwestward, having near its extreme Pyramid Islet, a small flat-topped islet, about 13 feet high, with steep sides; besides this islet a piece of rock on this ledge, with the appearance of a boat under sail, is visible at a short distance.

Beacons.—On Lama Gurgurud, a hill about 1¼ miles north-northwestward of Ruin Point, is a stone beacon.

A small pyramidal stone pillar stands on Pyramid Islet; the beacons are in line bearing about 350° and 1$\frac{1}{10}$ miles apart.

Dangers.—Ducouedic Bank, in the approach to Warsheik Anchorage, lies parallel to and about 2 miles from the coast with depths of from 3 to 5 fathoms over sand and broken shells over its western end; its shoalest spot is 2 miles east-southeastward of Pyramid Islet, but its extent eastward has not been determined, and as there may be possibly less water, it should be given a wide berth.

Staffetta Bank.—Ducouedic Bank lies on a bank about ½ mile in width, with depths under 10 fathoms, which fronts the anchorage, and on the continuation southwestward of this bank, and 1¼ miles southwestward of Ducouedic Bank, is Staffetta Bank with patches of 2¾ and 3 fathoms, and 10 feet near its southwest extreme; between these banks there are patches of from 3¾ to 5 fathoms.

Depths.—The least depth on the leading line over the bank is 4¼ fathoms and 15 fathoms at the anchorage.

Directions.—The following marks are conspicuous when approaching: Lama Gurgurud Hill, with its beacon, and Sifad Add, situated northwestward of the town, which is exceedingly white sandy hill, the summit covered with grass. The anchorage may be approached with the beacons in line, bearing 350°, which leads to it over the bank.

Anchorages.—The anchorage, in a depth of 15 fathoms, over sand, coral, and shells, and good holding ground, is on the line of the leading beacons, with Buleder Mosque 315°.

The anchorage for small vessels and dhows is within the ledge and rocky spit extending southwestward from Ruin Point, in depths of from 1½ to 3¾ fathoms, and completely sheltered except from the southwestward.

Tides.—It is high tide, full and change, at Warsheik about 4 h. 27 m.; springs rise 5¾ feet, neaps rise 4¼ feet.

Current.—In the offing, the current generally follows the direction of the coast, according to the prevailing monsoon; its rate varies, sometimes reaching 3 knots.

Town.—The town of Warsheik has some lofty stone houses, giving it the appearance of a fortress, but many are falling to decay; a fairly high tower is situated in the southern part, and the residency generally flies the Italian flag. The population is about 1,000.

Supplies of live stock to a limited extent are to be obtained with some difficulty, as they are brought from 3 or 4 days' journey in the interior. Water is scarce and bad.

Coast.—Warsheik Point, about 20 miles northeastward of Warsheik town, is fronted by a reef which extends northeastward along the coast, attaining off the next point a distance of 3 miles from the shore. Southwestward of Warsheik Point the coast is skirted by rocky ledges for about 9 miles, and midway between Warsheik Point and Athelet breakers have been observed at a distance of 3 miles from the shore.

Murot Hill, about 10 miles northeastward of Warsheik Point, is the northeastern termination of the Benadir coast, and from it chains of hills stretch to the northward; Murot Hill, showing as a dark crater between the sand dunes, is not particularly conspicuous from the southward, but from the northward it appears as a regular crater with a black rim.

Athelet (Itala).—Ras Malable is about 22 miles northeastward of Warsheik Point and between the former and Punta Itala (Uccelli), 2¾ miles farther northeastward, is the shore of Athelet anchorages, which presents a sandy coast with low sand hills.

Libeccio Bank, with shoal water beyond it, extends to the 5-fathom contour line to about 1½ miles eastward of Ras Malable, and Greco Bank, consisting of a series of narrow detached reefs, extends for a similar distance southeastward of Punta Itala; in the bight between these points shoal water extends about ⅔ mile, and for about ½ mile from the shore in the bight on the northeast side of Punta Itala to the 3-fathom contour line, with a small drying reef near its edge, the anchorages being in the south and north bights.

Beacons.—Near San Giorgio, about ¾ mile northward of Ras Malable, is a mast beacon surmounted by a ball, and 97° 320 yards from this beacon is a pyramidal beacon; these beacons in line bearing 277° lead southward of Greco Bank.

On Bur el Harion, a hill northward of the village, is a conspicuous pyramidal-shaped beacon, and 176° distant 220 yards from it is another pyramidal beacon, but surmounted by an inverted triangle; the beacons in line bearing 356° lead to the anchorage in the southern bight.

Nearly 1½ miles northward of Punta Itala is a pyramidal black and white checkered beacon, and a black and white rectangular-shaped beacon is situated 132° distant 350 yards from the preceding; the beacons in line bearing 312° leading to the anchorage in the northern bight.

Radio stations.—The mast of the radio station is situated on the northeast side of the village, and the station is open to the public from sunrise to sunset, the call letters being I. S. M. A station inland at Mahaddei Uen on the Doho River is also open to the public, its call letters being I. S. F.

Shoal.—A shoal of 1¾ fathoms, continued for 400 yards southward by depths of 2¼ fathoms, lies 1¼ miles to the southward of Punta Itala.

Anchorages.—The anchorage in the northeast monsoon, in the southern bight, is in a depth of about 3¾ fathoms, over coral, hard sand and good holding ground, with the beacons at Athelet in line bearing 357° and Son Giorgio Beacon 239°; large vessels can anchor farther south.

In the southwest monsoon, the anchorage is in the northern bight in a depth of about 4¼ fathoms, about 400 yards southwestward of the line of the leading beacons and with Punta Itala bearing 232°, while smaller vessels can anchor about 400 yards westward of this position in a depth of 3¾ fathoms; the anchorage is approached with the beacons in line bearing 312°.

Landing.—Quiet and safe landing may be effected at the village during the northeast monsoon.

Tides.—It is high water, full and change, at 3h. 0m.; springs rise about 6 feet.

Ternate Shoal, about 43 miles northeastward of Athelet, projects 2 or 3 miles from a low point of land, which is destitute of any distinguishing mark; there are depths of 17 and 18 fathoms a short distance outside it.

Mereg—Beacons.—Mereg, about 84 miles northeastward of Athelet, may be recognized by a white garesa or watchhouse, about 1 mile inland, eastward of which, situated on a dark hill, is a pyramidal beacon, surmounted by a flagstaff, while near the shore, on a low tower, there is a black and white beacon surmounted by an inverted triangle, but these landmarks are not conspicuous; this coast, backed by low sand hills, partly covered with grass, is said to extend farther eastward than charted.

Anchorage, in a depth of 5 fathoms, over sandy bottom, and good holding ground, may be obtained about ½ mile offshore at Mereg, with the beacons in line bearing 303°.

Daphne Shoal, the position of which is doubtful, is charted about 4 miles from the shore about 18 miles northeastward of Mereg. The least low-water depth found was 4 fathoms, but there may be less water; depths of 11 fathoms were found between the shoal and the shore.

Coast.—Between Mereg and Ras Asswad, a distance of about 60 miles, the coast is generally low and free from danger, with the single exception of the Daphne Shoal.

Ras Asswad is a point of low black cliffs projecting into the sea from the sand hills over the beach, the land near it to the southward being low; but to the northward, although quite featureless, it is about 650 feet high and known to the Arabs as Al Herab, or the mountainous country; it may be seen from a distance of nearly 30 miles. About 2 miles offshore along this portion of the coast the depths are from 20 to 30 fathoms.

Elhur, about 32 miles northeastward of Ras Asswad, may be distinguished when approaching from the southward by the light-red color of the sand dunes behind it and the nearly dry bed of the Didinta River, which passes over a hill behind the village, but from a distance it might be mistaken for Obiat; therefore it should be remembered that the land is high both to the southward and northward of Elhur, while it is low to the northward of Obiat; also that to the southward of the latter place is a large sand hill with three conspicuous heads.

Anchorage.—Although somewhat similar as an anchorage to some other places farther northeastward, it has the great advantage of far better and safer landing. The depths are regular, being about 5 fathoms at 1 mile and 11 fathoms at 2 miles from the coast, and there are no known dangers; anchorage in the former depth may be taken up at nearly 1 mile from the shore, with the garesa bearing 326°.

Landing.—The landing is protected by a natural breakwater formed by a barrier reef lying parallel with the shore, inside of which there is landing for a large number of boats in perfectly smooth water. The depth inside the reef is 5 feet at low water and about 12 feet at high water.

Village.—The village, consisting principally of some huts built on a sand hill about 50 feet high and having also a few stone houses, is a port of export of minerals from the adjacent districts.

Supplies.—There is plenty of excellent grazing for cattle, and good water at this place.

Obiat (Obbia).—Diga (Obiat) Point, 10 feet high and the extreme of a narrow spit of land extending about 200 yards north-northeastward, is about 26 miles northeastward of Elhur, and fronting it is Obiat anchorage; the shore is bordered by sand hills, and a large undulating plain rises gradually toward the west, which is quite open, with a firm sandy soil covered with grass and coarse herbage, affording excellent grazing during the wet season, but is said to commence drying up after January.

On the south side of Diga Point, shore bank, under 3 fathoms, extends about 400 yards, but on its north side it stretches off nearly twice that distance, and near its edge are South and North Rocks, the former, 7 feet high, being 700 yards, and the latter, covering at high water, 1,100 yards, north-northeastward of Diga Point, from which a small reef covering at high water is distant 200 yards in the same direction. A patch of 3 fathoms lies outside the 3-fathom contour line, about ¼ mile northeastward of the same point.

Dhows find shelter in the bight within these rocks, and there is room for a few close under the point in about 2 fathoms during the southwest monsoon.

Light.—From the residency at Obiat there is exhibited a fixed white light, visible 3 miles over an arc of 225°. Approximate position, latitude 5° 20′ north, longitude 48° 32′ east.

Anchorage.—About 600 yards eastward of South and North Rocks there is anchorage in a depth of about 5 fathoms, with fair holding ground, but entirely exposed; a heavy swell almost always prevails, and when the wind freshens it causes a breaking sea very bad for boats. A good berth for a large vessel is in a depth of 6 fathoms, with the garesa or watch house bearing 266°, and South Rocks 313°.

Landing.—The landing place, sheltered by Diga Point, is also partially protected by some off-lying rocks, through which there is a passage close to the point, which, at high water and in bad weather, causes the swell to affect the landing place. Boats approaching the landing usually go around the rocks and through the passage when coming out.

During the southwest monsoon the landing is fairly well protected, but during the northeast monsoon it is bad, and the sea at times breaks inside the rocks, where there is but little water.

Tides.—The spring rise at Obiat is 7¾ feet.

Current.—A strong south-going current runs during the northeast monsoon.

Wind.—During the northeast monsoon the wind was observed to be especially strong at full and change of the moon, sometimes reaching a force of 7; the wind sometimes veering to east-southeast as it subsided, then altogether died away, remaining so for about two days, after which, and backing to the northward, it again commenced blowing as before, this being repeated with great regularity.

Village.—Obiat village, situated on the shore of the small bay immediately within Diga Point, consists of two large white stone houses with flat roofs, one of which, with a flagstaff, is the garesa or watch house; also several huts; a road from the village leads to Gulkayo, in the Mudug district, a distance of 76 miles.

Water.—Several small wells are situated near the town, the water lying only 2 or 3 feet below the surface, is quite potable, but a well may be dug in less than an hour; and it is reported that at a depth of from 2 to 5 feet water can be obtained from the whole length of a narrow strip of land from Mogadiscio to Obiat, between a ridge of sand dunes and the sea on the one side and a grassy plain on the other.

Reef.—About 15 miles northeastward of Obiat is a projecting sand dune faced by a rocky cliff, off which a reef is said to extend 2 miles with a depth of 10 fathoms close-to.

Coast.—**Ras Awath**, from 250 to 330 feet in height, is a slight projection of the coast about 70 miles north-northeastward of Obiat, the coast for about 20 miles to the southward being rocky and monotonous; about 3 miles southward of the ras is a solitary tree, which, being visible from a distance of 8 miles, forms a good mark, and 1 mile northward of it a slight rise in the coast, with a flat summit, will be seen. Rocky ground, on which there is a depth of 10 fathoms, extends about 2 miles off Ras Awath.

From Ras Awath, hills continue a short distance to the northward, after which the coast becomes low, steep, and with sand hills in places, continuing so for about 40 miles, through which distance it is fertile, with numerous flocks of sheep, goats, and herds of camels, but afterwards becoming high and rocky and apparently deserted as far as Ras al Khyle; it is known to the Arabs as Sef Tweel or low coast, and landing on it is impossible.

For the remaining 60 miles to Ras el Khyle the coast is high, rocky, and appears to be barren and deserted. As this part is little known it should not be approached within a distance of 5 miles, keeping a lookout for discolored water should the sun be in a favorable position.

Ras al Khyle, northern of three distinct cliffs jutting out from the coast, about 1 mile apart, forms the southern extreme of Negro Bay, at the head of which is Wadi Nogal, the depths being from 6 to 7 fathoms at 1 mile offshore, between Ras al Khyle and the entrance to that river.

Illig.—A short distance northward of Ras Al Khyle is Ras Illig, 115 feet high, and between the latter and a point nearly 4 miles north-northwestward, where the Wadi Gulul discharges, is a bight, receding about 1 mile, and divided into two nearly midway by a point, southward of which is Illig village.

From Ras Illig to about ⅔ mile northward of the point near the village, shore bank, under 3 fathoms, extends ¾ mile offshore.

Anchorage.—There is anchorage during the southwest monsoon northward of Ras Illig in depths of about 5 or 6 fathoms, good holding ground, with the point bearing 172°, 1¼ miles, and the mouth of Wadi Gulul about 324°, but the wind blows with considerable force at this anchorage, and the swell causes a vessel to roll heavily.

Landing in the southwest monsoon may be effected without difficulty in native surfboats, but during the northeast monsoon it is not so easily accomplished; at this season the best places are on a beach about 300 yards long near the village or on a longer beach ½ mile farther northwestward; also at the entrance of Wadi Gulul, but at all three places the surf during this monsoon is very heavy and landing is impossible in ships' boats, and in either monsoon it would appear that the landing at the village is best, the two worst months in the year being January and February.

Wadi Gulul entrance, 2½ miles northward of Illig, is quite dry, in the dry season, and its mouth barred by sand; a few huts are situated near its mouth, with trees, shrubs, and pools of water in the ravine, but the coast itself is desolate.

Wadi Nogal, about 7 miles northward of Wadi Gulul, forms a deep hollow in the coast hills in a northwest and southeast direction, and its entrance may be recognized by a red cliff, under which are two yellow points, with a dark round-topped hill at the back; the valley extending from Ras al Khyle to Berbera in almost a straight line between two ranges of mountains apparently forms the great trade route for the natives, who bring gums, ivory, and ghi along it. Berbera, in the Gulf of Aden, is the principal port from which these products are exported.

Anchorage may be obtained off the Wadi Nogal with the mouth of that river bearing 302° and Ras Illig 185°, about 1,100 yards offshore, or off the north side of the entrance in a depth of 7 fathoms, with Ras Gabbe bearing 225°, about 1,750 yards offshore.

Water.—A basin just within the entrance to Wadi Nogal contains brackish water, but the water, where it enters the basin from above, is quite fresh; in October there was but a slight overflow to the sea.

At Ghobak, about 1 mile up, a ravine, close westward of Ras Gabbe, there is said to be a spring of fresh water.

Ras Gabbe (Cape Bowen) is about 20 miles northeastward of the Wadi Nogal, and southward of the ras is a bay where small craft find sheltered anchorage during the northeast monsoon; the Gabbe River runs into the sea near the ras through a deep ravine.

Landing may be effected on the shore southward of Ras Gabbe.

Coast.—From Ras Gabbe the coast, trending north-northeastward for 85 miles to Ras Mabber, is rocky, varying from 200 to 400 feet in height, and is known to the Arabs as Hazine, or "rough ground"; a point about 15 miles from Ras Gabbe is covered with drift sand, but the coast is everywhere equally sterile. There are no known dangers off this coast, and apparently depths of about 20 fathoms will be found at no great distance off the southern part.

Ras Gonded is about 5 miles northward of Ras Gabbe, and in this locality are some conspicuous sand hills.

Winds.—The southwest monsoon ends at Ras al Khyle about mid-October, and, after a few days' variable winds and calms and an easterly swell, the northeast monsoon usually begins, although sometimes it is as late as the middle of November; it continues until mid-April, when the southwest monsoon sets in.

Ras Mabber, a rocky point projecting about 3 miles in an east-southeast and opposite direction, easily recognized from a distance of 7 or 8 miles, is marked, at its precipitous entremity, by a conspicuous dark bush, and is fronted by a reef on which the sea breaks; the land in its vicinity is generally low, and both northward and southward of the point, the coast is steep, with deep water close-to, there being in places about 16 fathoms at 400 yards offshore.

Bander Bela, a small bay northward of Ras Mabber, affords anchorage during the southwest monsoon in 6 fathoms, where dhows at times put in for water; there are two villages at its head. The 5-fathom contour line is about 150 yards from the shore, the bottom being sand and shells; minerals amongst the rocks are said to cause discoloration of the water.

Directions.—The anchorage should be approached with great caution, and in coming from the northward steer 210° for a white patch above a declivity about the center of Ras Mabber, until the station bears 258°, when alter course for it.

Coast.—From Ras Mabber the coast trends northward for about 56 miles to the head of the bight and then turns eastward for about 30 miles to Ras Hafun; depths of from 20 to 30 fathoms are charted from 5 to 10 miles off this coast.

Ras Hafun is the eastern termination of a peninsula 13 miles long in a northwest and opposite direction, 8 miles wide, and from 400 to 600 feet in height, rising in steep cliffs from the sea and formed of sandstone and limestone; it is connected to the mainland by a narrow isthmus, consisting of a ridge of white sand, shells, and mud covered with stunted bushes, and having a least width of 2 miles.

The eastern extreme of the peninsula is perfectly flat and the interior consists of undulating hills deeply intersected by ravines and watercourses, while the southwestern point is high and level, appearing like a barn, whence it is sometimes named Barn Hill; at a distance it appears separated from the rest of the peninsula, the land between being low.

The peninsula in the Mijertein district is inhabited by the Aial Fatha branch of the Othman family who have a few miserable huts; they are friendly to strangers and may be trusted. Cattle and firewood are procurable, but the water from the well is bad.

On either side of the isthmus is a deep bay, with good anchorage in one of them according to the season.

Tides.—It is high water, full and change, at Ras Hafun at 4 h. 15 m.; springs rise 4 feet.

Hafun South Bay is best adapted for vessels during the northeast monsoon, but a change of two or three points in the direction of the wind causes the swell to roll in and a heavy surf on the beach; the depths in the bay are regular, decreasing gradually toward the shore, with the exception of a 3-fathom patch of sand about 1,400 yards off the northern shore, with the southwest extreme of Barn Hill bearing about 137°.

Anchorage.—The depths are greater to the westward than toward the peninsula, where the best anchorage in is depths of 6 or 7 fathoms over sand, at from 1 mile to 1¼ miles from the shore, with the southwestern point of Barn Hill bearing about 130°. On the southeastern and eastern sides of the peninsula there are from 15 to 20 fathoms close in to the cliffs, increasing to 100 fathoms at about 13 miles from the cape; the nature of the bottom being sand and rock.

The bay is much frequented by shark fishers from the Arabian coast, many of whom reside here throughout the year, merely moving their fishing boats across or round to the other side of the isthmus as the monsoon changes.

Note.—The coast to the northward of Ras Hafun will be found described in the Red Sea and Gulf of Aden Pilot.

APPENDIX I.

Regulations for the harbors of the Union of South Africa.—His Excellency the Governor General, with the advice of the Executive Council, has been pleased, in terms of act, No. 36 of 1896 (cape), and acts Nos. 3 of 1894, 3 of 1899, 4 of 1902 (Natal), to approve of the following revised regulations of the harbors of the Union of South Africa, to take effect on July 1, 1914.

6. Should the master of any ship shift or change the authorized berth of his ship without obtaining the previous sanction of the port captain he shall be liable to the penalty provided in regulation No. 209. "A fine not exceeding £10 sterling, or in default of payment to imprisonment for a period not exceeding one month, or to both such fine and imprisonment."

12. The port manager may refuse to berth any ship or to permit cargo to be landed from any ship until suitable wharf, shed, quay, or other accommodation is available for such cargo, or until arrangements to his satisfaction have been made for the removal and storage of the cargo as the same may be landed.

13. Ships entering, lying in, or passing out of a harbor shall have their sails furled and yards braced sharp up; jib booms rigged in; martingales unshipped, boats swung inboard; booms, davits, bumpkins, and projections of any kind rigged in; and shall, if required by the port captain, have their anchors on deck and properly stowed; and all awnings and deck coverings furled or removed as may be required. The regulation shall not apply to the outer anchorage of any harbor.

No ship shall enter a harbor until the proper signal shall have been hoisted at the signal station authorizing such entry, but this regulation does not apply to a ship entering the outer anchorage of any harbor.

15. Ships entering, leaving, or removing within a harbor must be provided with sufficient hands for those purposes, in default of which the work may be done by the administration at the ships' risk and expense, and they must at all times be kept in fit condition for removal. Such ships must also be provided with good and sufficient warps, and must be moored by such warps, and no warp may be cast off for any reason unless so ordered by the port captain. In the

case of ships not being suitably found with the necessary gear, warps may be supplied by the administration at the expense of the ship. In no case shall the administration be liable for any damage that may result from the inefficiency of any rope or warp which it may hire to the ship or allow to be used, or in connection with any assistance rendered by the administration to ships entering, removing in, or leaving any harbor.

16. The master of a ship lying within a harbor shall have insufficient hands on board to attend to his moorings and to cause them to be slackened or hove in, as may be necessary, to prevent damage being done to that or any other ship, or to the harbor works. No rope shall be made fast except to the dolphins, buoys, mooring posts, and bollards placed for the purpose, and no wire rope may be used, unless the bollards and the edge of the coping of the wharf or jetty are protected from chafe to the satisfaction of the port captain. No chain cable shall be used for moorings, except with the special permission of the port captain.

17. Masters of ships will be responsible for all damage or consequences resulting from any erroneous declaration made by themselves or their representatives as to the draft of water or dimensions of their ships.

18. Masters of ships having on board explosives, cartridges, fuses, matches, fireworks, acids, calcium carbide, or other goods of a dangerous or inflammable nature, shall, on arrival, give notice thereof to the port captain, and such cargo may not be landed before the delivery of forwarding orders are handed in to the administration. If any such substances are landed on any quays, wharves, or jetties, the port manager may order the same to be placed on board the ship from whence they came, or otherwise deal with them or destroy them, as he considers necessary, at the risk and expense of the ship from which they were discharged; and, in addition, the master shall be liable to such penalties as are provided by law. The said goods shall, if required, be discharged at such a time as will enable them to be disposed of or otherwise removed from the quay, wharf, or jetty during working hours of the same day. Nothing herein contained shall exempt any master from the due observance of the provisions of the explosives act, 1911, and the regulations made thereunder.

No ship may enter or leave a harbor or shift from one berth to another therein upon any Sunday or holiday or after working hours of the harbor, except with the permission of the port captain, who, if such permission is granted, will make the necessary arrangements for the attendance of harbor employees, for whose services the ship shall pay overtime charges incurred, if any.

26. No ship may discharge or take in cargo, coal, or ballast on Sundays or holidays or after working hours, unless the consent of

the port manager has been specially obtained for the purpose, and then only on payment by the ship of the overtime charges incurred, if any.

34. The following regulations regarding coaling shall be specially applicable to Durban, but not to other harbors:

(1) All ships requiring coal shall load or bunker same by means of the administration's coaling appliances unless sufficient and proper reason to the contrary is shown to the satisfaction of the port manager, whose decision on that point shall be final. The master or agent of the ship shall sign the prescribed application for the use of the coaling appliances.

(2) Ships shall be berthed at the coaling appliances in the order of arrival, subject to the discretion of the port manager, who may vary that order in cases of urgency, provided that any ship not ready for its turn shall abandon its right to the ship next in turn.

(3) If a ship's full requirement of coal is not to hand during the coaling operations, such ship shall, immediately the supply becomes exhausted, vacate the berth to the ship next in turn.

(4) Ships berthed near or under the coaling appliances shall have a sufficient crew on board ready to shift the ship at any hour, day or night, as or when directed by the port captain. On failure to immediately comply with the order of the port captain, the shifting may be effected by the administration at the risk and expense of the ship.

(5) The trimming of coal loaded by the coaling appliances shall in every case be undertaken and carried out by the administration, and any dispute arising between the administration's contractor and the master or agent of any ship shall be referred to the officer in charge of the coaling appliances, and thereafter, if necessary, to the port manager.

(6) The administration shall not be liable for any detention or loss to any ship occasioned by a breakdown of the coaling appliances, failure of supply of electric energy, or other cause unless such other cause shall arise from the negligence of the administration's servants.

(7) Any person who shall contravene paragraphs (1) to (4), inclusive, of this regulation shall be liable on conviction to a fine not exceeding £50, or in default of payment to imprisonment for a period not exceeding three months, or to both such fine and imprisonment.

45. All ships, whether under way or at anchor, shall exhibit the lights and carry out the rules laid down in the British Board of Trade Regulations for preventing collisions at sea.

46. On entering a harbor a ship shall immediately hoist her national colors.

49. No external repairs of ships may be made or may take place in any dock or basin, or alongside a wharf, jetty, or quay, except with

the written permission of the port captain, and then only upon the following conditions:

(1) That before any repairs are commenced the master shall take such precautions to prevent dirt or other matter falling into the docks, basin, or river, as the port captain may direct.

(2) That the master shall perform such other conditions as the port captain may impose in his written permission.

(3) That should the master fail to comply with the provisions of this regulation any permission which may have been granted to effect repairs to a ship as aforesaid may be withdrawn and the work stopped by the port captain.

65. Save as otherwise provided by statute or regulation, at the harbors of Durban and East London, or any other harbors that may from time to time be so proclaimed by the Governor General, employment of a pilot on all ships crossing the bar of the harbor or shifting berth in the harbor is compulsory.

67. The following ships shall be exempt from compulsory pilotage at the harbors of Durban and East London:

(1) Ships licensed by the administration to ply for trade or hire outside or inside the bar of the harbor and within the limits of the coast of Natal or Cape Province, respectively.

(2) Ships that may obtain a special exemption license from the administration.

89. No ship may be admitted to a dry dock or slip in a harbor until her name and full particulars shall have been entered in a book to be kept for that purpose at the port office of the harbor, nor until the master of the ship and her owners or agents shall have signed an undertaking to conform to the conditions prescribed by these regulations.

98. No ship shall remain in occupation of a dry dock or slip for a longer period than four days, except by the special authority of the port captain, but should circumstances arise which were not known at the time application was made for the ship to enter a dry dock or be placed upon a slip, necessitating a longer occupation, the port captain may in his discretion extend the period of occupation for such further time as may be requisite for the completion of the work.

109. No ship may anchor or be moored or placed at any spot within the water area adjacent to any floating dock or slip, and such area shall at all times be denoted by suitable marks placed for that purpose, nor shall any person place any chain, anchor, or other obstacle in any such water area.

Simons Bay—Regulations for dockyard port.—His Excellency the Governor-General-in-Council has been pleased, under section 4 of the Simons Bay dockyard port regulation statutes, 1898–1912, to make the following regulations and to cancel those published in the Gazette of the Colony of the Cape of Good Hope under Government notice No. 732, dated September 11, 1899.

1. The area of the dockyard port as defined by the statutes above mentioned is included within the following boundaries:

On the east so much as is comprised within a line drawn due south from the Phœnix Buoy to the shore, meeting a line drawn 328° from the Phœnix Buoy to the shore on the south of Elsey Bay; on the northwest, west, and south, the line of high-water mark of spring tides between the points where the above-defined lines meet the shore, with all bays, creeks, lakes, pools, and rivers as far as the tide flows, which boundaries are delineated on a plan filed in the office of the surveyor general, marked 2,554 MM.

2. No vessel shall moor or anchor so as to obstruct navigation in or out of the dockyard port.

3. The senior naval officer shall have exclusive right to lay down moorings within the area of the dockyard port. Merchant ships must anchor only in berths assigned to them by the senior naval officer or his representative. Freedom of access will be given at all times, when the space is not required for His Majesty's ships and vessels.

4. No gunpowder or other explosive shall be allowed on board merchant vessels without the written permission of the senior naval officer, and no merchant vessel shall be allowed to discharge loaded ordnance within the whole area of the dockyard port as laid down in section 1 of the "Simons Bay dockyard port regulation statutes, 1898–1912." The loading or unloading of gunpowder or other explosives shall be regulated by the senior naval officer.

5. No merchant vessel shall be permitted to have on board any quantity of tar, oil, or other combustible substances beyond such as may be required for her general use within the limits of the dockyard port without the permission of the senior naval officer.

6. The senior naval officer is authorized from time to time, where the naval service requires it, to limit the speed of steam vessels to a speed not to exceed 4 knots within the limits of the dockyard port, as laid down in section 1 of the act above quoted.

7. Every merchant vessel of and above 150 tons anchored or moored within the dockyard port shall have on board at least one person at all hours of the day and night.

8. If at any time the anchor of any merchant or other private vessel hooks any Government moorings, or any electric cables, or moorings of buoys, the master or other person having the charge or command of such vessel shall not proceed to unhook the same, but shall forthwith give notice thereof to the senior naval officer in order that aid may be given for clearing such moorings or cables without doing damage to the same.

9. No merchant or other private vessel or boat shall, without license in writing from the senior naval officer, be moored or fastened to any Government moorings, buoys, piles, or vessels in the dockyard port.

10. No ballast, stones, earth, clay, refuse, ashes, rubbish, dust, filth of any description, and no refuse from any quarry, mine, or pit shall be unladen, cast, or allowed to fall into the waters of the dockyard port, except in such places as are appointed by the senior naval officer, or into or upon the banks, or any portion of the shore of the said dockyard port, or into or upon the shores of any rivers or streams discharging into the said dockyard port where the same may be liable to be washed into the waters of the dockyard port by rain, tide, or otherwise.

11. Nothing, however, in the foregoing provision shall be deemed to exclude such vessels as require admission to the town pier for loading and unloading cargoes; and all such vessels shall continue to enjoy their accustomed privileges in this respect as fully as if these regulations had not been made, provided they do not impede or interfere with the navigation of His Majesty's vessels.

12. The master of every vessel to which these regulations relate shall observe and cause them to be observed so far as they relate to his vessel, and if any master or other person acts in any respect in contravention of any of these regulations, or fails to observe or cause to be observed in any respect, any of them, he shall be liable on conviction to a penalty not exceeding £10 or to imprisonment, with or without hard labor, for a period not exceeding three months.

APPENDIX II.

Particulars of dry docks, patent slips, etc.

Port.	Name of dock.	Length.		Breadth of entrance.	Depth at M. H. W. S.		Springs rise.	Lifting power.	Date built.	Remarks.
		On blocks.	Over all.		On sill.	On blocks.				
		Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Tons.*		
Simon Bay	Admiralty, Selborne	740	756½	94	36¼	36¼	5¼	......	......	As one dock.
		763½	779 10/12	(1)	(1)	(1)	(1)	......	......	
	Admiralty, Selborne, outer	......	470¾	94	36¼	36¼	......	......	......	As two docks.
		......	494¼	(1)	(1)	(1)	(1)	......	......	
	Admiralty, Selborne, inner	240	256	94 5/12	38¾	35¼	......	......	......	
	Admiralty, Selborne, outer	......	320¾	94	36¼	36¼	......	......	......	Do.
		......	344¼	(1)	(1)	(1)	(1)	......	......	
	Admiralty, Selborne, inner	390	406⅓	94 5/12	38¾	35¼	......	......	......	
	Patent Slip, No. 1	170	......	......	Forward Aft	12¼ 21	......	500	......	
	Patent Slip, No. 2	78	......	......	Forward Aft	8 12	......	80	......	
	Patent Slip, No. 3	108	......	......	Forward Aft	6 11½	......	100	......	
	Patent Slip, No. 4	77	......	......	Forward Aft	3¾ 9¾	......	50	......	
Mossel Bay	Patent Slip	68	......	......	Forward Aft	3½ 7½	6½	150	......	
	Patent Slip (building)	......	......	......	Forward Aft	10 14	......	250	......	
Port Elizabeth	Patent Slip	120	......	......	Forward Aft	9¼ 14½	5¾	400	......	
East London	do.	200	......	......	Forward Aft	8¾ 17	5½	1,000	......	
Durban	Floating (Government)	475	475	70	27	23	6½	8,500	1903	
	Graving dock (construction sanctioned)	......	1,030	110	41	......	......	......	......	
	Patent Slip	114	......	......	Forward Aft	9 16	......	200	......	
Delagoa Bay	Le Moy	......	156	28	......	8	12½	......	......	
Dar es Salaam	Floating (Government)	......	213	55⅓	......	20	10¾	2,000	1901	Destroyed.

[1] Caisson in outer stop.

APPENDIX III.

List of principal ports, showing particulars of depths, etc.

Port.	Depth at M. L. W. S. in channel of approach.	Depth at M. L. W. S. in anchorage.	Rise of tide.	Remarks.
			Feet.	
Amelia, Porto	25 to 35 fathoms	14 fathoms	15	
Athelet		3¾ fathoms	6	In NE. monsoon.
		4¼ fathoms		In SW. monsoon.
Bartholomew Diaz, Porto	2½ fathoms	7 to 8 fathoms	12	
Bazaruto Bay	7 to 8 fathoms	3 to 5 fathoms	12	
Beira				See Pungue River.
Birikau River	3½ to 4 fathoms	6 to 9 fathoms	12	
Brawa		6 to 12 fathoms	6½	In NE. monsoon.
		5 fathoms		In SW. monsoon.
Chaki Chaki Bay	11 to 18 fathoms	7 to 10 fathoms	12	
Chinde Mouth (Zambezi River).	6 to 9 feet		12	
Chole Bay (Mafia Island)	6 to 11 fathoms	4 to 8 fathoms	15	
Conducia, Bahia	4½ fathoms	6 to 9 fathoms	12	
Dar es Salaam Bay	14 to 16 fathoms	4 to 7 fathoms	10¾	
Dar es Salaam Harbor	3½ to 4 fathoms	6½ to 9 fathoms	10¾	
Delagoa Bay:				
South Channel	19 to 21 feet	4½ to 8 fathoms	12	
Middle Channel	27 feet			
North Channel	5½ to 10 fathoms			
Duarte Pedroso Port	11 fathoms	4 to 7 fathoms		
East London	24 to 25 feet		5½	
Elizabeth, Port		5 to 10 fathoms	5¾	
Funzi Bay	6 to 7 fathoms	4 to 4½ fathoms		
Gaze Bay	do	3¾ to 4½ fathoms		
George, Port	10 to 20 fathoms	8 to 14 fathoms		
Hafun, South Bay		6 to 7 fathoms	4	
Ibo Harbor	6 to 8 fathoms	5 to 11 fathoms	11	Outer anchorage.
Innamban	14 to 18 feet	24 to 32 feet	11	
Kiliman		5 fathoms		Do.
	12 to 13 feet	19 to 25 feet	12	Inner anchorage.
Killindini, Port	6½ fathoms	12 fathoms		
Kilwa Kisiwani	10 to 44 fathoms	10 to 20 fathoms	12	
Kishi Kashi, Port	4 fathoms	6 to 10 fathoms		
Kisimayu:				
Fawn Pass	5 fathoms	3½ to 3¾ fathoms	10	
Knott Pass	do			
North Channel	10 to 14 fathoms			
Kiswere Harbor		4 to 12 fathoms	12	
Kiuyu, Port	13 to 36 fathoms	12 fathoms		
Lamu Bay	5 fathoms	5 fathoms	11	
Lamu Harbor	18 feet	24 to 25 feet		
Lindi, Mto	17¾ feet [1]	7 to 10 fathoms	11	
Lourenço Marques	21 feet [2]	36 to 48 feet	12	
Manda Bay	5¾ fathoms	6 fathoms		
Manda Roads (Muhaji Channel).	6 fathoms	8 to 14 fathoms		
Barracouta Channel	11 fathoms			
Mazimbwa Bay		4 to 8 fathoms		
Mchinga Bay		3 fathoms	12	
Merka		11 fathoms	8	In NE. monsoon.
		12 fathoms		In SW. monsoon.
Mikindani Harbor	5¾ to 12 fathoms	7 fathoms	12	
Mogadiscio		6 fathoms	6	
Mombasa, Port	5½ fathoms	6½ to 8 fathoms	12	
Mossel Bay		6 to 8 fathoms	6½	
Mazambique: South Channel.	4 fathoms	7 to 8 fathoms	12	Outer anchorage.
Mozambique, Port	3½ to 5 fathoms	3½ to 4½ fathoms		Inner anchorage.
Mtwara, Mto		7 to 10 fathoms	12	
Natal, Port	About 35½ feet		6½	
Patta Bay:				
South Pass	5½ to 6 fathoms	6 fathoms	10	
North Pass	4½ fathoms			
Pungue River	12 feet		20	
Simons Bay		10 fathoms	5¼	30 feet in basin.
Tanga Bay:				
South Channel	3 fathoms	7 fathoms	12	
Ship Channel	11 fathoms			
Tudor, Port	5½ fathoms	7 fathoms		
Tula, Port	4 to 10 fathoms	3 fathoms		
Tunghi Bay	8 to 9 fathoms	6 to 10 fathoms	14	
Warsheik	4½ fathoms	15 fathoms	5¾	
Wasin Channel	5½ to 9 fathoms	7 fathoms	12	

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[1] Not recommended for vessels over 20 feet draft, unless bar is examined.

[2] In course of deepening to 26 feet.

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